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Rural Irrigation Price Review 2020–24
Queensland Competition Authority
30-Aug-2019

Rural Irrigation Capital Expenditure Review

Sunwater

Rural Irrigation Capital Expenditure Review

Sunwater

Client: Queensland Competition Authority

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Glossary

Term	Definition
AMP	Asset Management Plan
AMS	Asset Management System
ANCOLD	Australian National Committee on Large Dams
ASX	Australian Securities Exchange
BOM	Bill of Materials
CPR	Commonwealth Procurement Rules
CPT	Central Procurement Team
HUF	Headworks Utilisation Factor
IAC	Irrigator Advisory Committee
ICT	Information and Communications Technology
ISO	International Organization for Standardization
MCA	Multi Criteria Analysis
ML	Mega litre (1 million litres)
NSP	Network Service Plan
P3MF	Project, Program and Portfolio Management Framework
PCR	Procurement Compliance Review
QCA	Queensland Competition Authority
RAB	Regulatory Asset Base
SAMP	Strategic Asset Management Plan
SAP	Systems, Applications and Products in Data Processing (an Enterprise Resource Planning system by SAP AG)
SEQ	South East Queensland
SFM	Sunwater Financial Model
SOA	Standing Offer Arrangements
The price path period	The period 1 July 2020 to 30 June 2024
The referral	the referral for the review issued by the Queensland Government to the QCA under section 23 of the QCA Act
The review	the QCA's review of irrigation prices for the period 1 July 2020 to 30 June 2024
The historical transitional period	The period 1 July 2018 to 30 June 2020
ToR	Terms of Reference
TOTEX	Total Expenditure
WAE	Water Access Entitlements
WMS	Work Management System

Executive Summary

Sunwater is a government owned corporation that owns and manages a regional network of bulk water supply infrastructure throughout Queensland that supports irrigated agriculture, mining, power generation, industrial and local government. Sunwater's water storage and distribution infrastructure includes 19 major dams, 64 weirs and barrages, 79 pumping stations, and more than 2500 kilometres of pipelines and water channels.

The Queensland Government has directed the QCA to conduct an investigation into pricing practices relating to the monopoly business activities of Sunwater (bulk water storage and water distribution). A key objective of the investigation is to recommend prices to be charged by Sunwater to irrigation customers in specified 22 water supply schemes (WSSs) and seven distribution systems for the price path period from 1 July 2020 to 30 June 2024.

AECOM was engaged by the QCA to provide advice and guidance to assist the QCA to determine the prudency and efficiency of the Sunwater's historic and forecast renewals expenditure in specific WSSs and distribution systems, as well as forecast capital expenditure on dam safety upgrades.

The scope of our review of Sunwater's renewals expenditure related to 22 WSSs and five of the seven distribution systems and covered:

- Review of Sunwater's submissions on proposed renewals and dam safety upgrade capital expenditure
- Review of Sunwater's policies and procedures for renewals expenditure
- Assessment of the prudency and efficiency of proposed renewals and dam safety upgrade capital expenditure including:
    - Forecast renewals expenditure proposed over Sunwater's proposed planning period from 1 July 2020 to 30 June 2053, which in this report is expressed as price path period starting from 1 July 2020 (FY21) to 30 June 2024 (FY24) and beyond price path period starting from 1 July 2024 (FY25) to 30 June 2053 (FY53)
    - Renewals expenditure in previous price path periods until 30 June 2020, which in this report is expressed as historical actuals from 1 July 2012 (FY13) to 30 June 2018 (FY18) and historical transitional period from 1 July 2019 (FY19) to 30 June 2020 (FY20)
    - forecast capital expenditure by Sunwater on dam safety upgrades over the price path period from FY21 to FY24

AECOM has applied a team of specialist staff for this review, including engineers of various disciplines, cost management specialists and analysts coordinated by its Advisory group.

This review has primarily been a desktop review based on the documentation requested through an initial round of requests for information, with several rounds of requests for additional documentation to clarify particular issues. Where the documentation did not provide sufficient clarity, AECOM conducted a number of in-person interviews with key Sunwater staff to understand the practical applicability of policy and procedures and obtain evidence that would further support a recommendation. To ensure consistency of approach, each technical reviewer used a standard template for the review, which was designed to address all items required by the terms of reference for the review and constructed to ensure that all issues that could influence a decision on prudency or efficiency were included.

In general, the assessment of renewals project expenditure was undertaken by reviewing a representative sample (in consultation with the QCA) with focus on material renewal items while seeking to ensure that any inferences drawn from the sample assessment are applicable across un-sampled renewals expenditure for example any adjustments due to observed systemic issues could be applied to the wider renewals program.

While there are a number of conclusions and recommendations made as result of the tasks under the scope of this review, this executive summary summarises the material conclusions made in relation to deductions to the submission values.

Historical Renewals (FY12-FY18)

Sunwater's submission included more than 2,200 individual projects for the schemes under review, for the historical FY12-FY18 period. We observed significant variation between Sunwater's actual expenditure ($158.1 million) to both Sunwater's proposed capital expenditure for the period and the QCA's accepted values. The primary driver of these exceedances appears to be flood damage repair costs associated with major weather events across the period. This, along with flood damage works representing a different nature of project, led us to separately identify flood damage projects from other historical renewal projects for sampling purposes.

Out of the 11 projects related to flood damage originally selected for review, four are finally reported on, because the information for one of the projects was later termed to be legally privileged, hence not accessible and six others were subject to ongoing insurance claim and therefore the net expenditure was not yet known at the end of June 2019.

A deduction of 6.3% is recommended as an adjustment related to observed systemic issues and could potentially be extrapolated to the full flood damage repair costs related to historical projects after excluding the outlier cost deduction for Boondooma Legal Insurance costs.

Of the non-flood damage related historical projects, 17 projects were reviewed representing ~10.6% of the value. For these projects, a deduction of 4.2% is recommended as an adjustment related to observed systemic issues and could potentially be extrapolated to the full historical projects portfolio.

Transitional (FY19-FY20) and Future Renewals (FY21-FY53)

Over 14,000 projects in Sunwater's original submission had expenditure occurring in the transitional (FY19-FY20), price path (FY21-FY24) and beyond price path (FY25-FY53) periods. 65 projects representing 4.8% of NPV (FY19$) were reviewed. It is to be noted that a number of these projects have expenditure occurring over several years and therefore can fall under one or more of the three periods.

Over 2000 projects of those over 14,000 projects had expenditure occurring in the transitional and price path periods. Of this subset, 32 were included in the final review sample, representing 10.7% of the total present value (FY19$) of projects over period (21.0% of Irrigation/Bulk scheme projects and 1.4% of distribution schemes projects). A number of these projects have expenditure occurring over a number of years and therefore can fall under one or more of the three periods

The total recommended deduction for systemic issues identified in the transitional years (FY19-FY20) that are not captured by annuities assessment is 5.1%. Additionally, the total project-specific adjustment is $108,000 and reflects adjustments to two projects.

The total recommended deduction for systemic issues identified in the price path period (FY21-FY24) that are not captured by annuities assessment is 1.6%. This particular systemic adjustment is based on one project in this particular period, however this deduction has been recommended as a systemic adjustment due to similar systemic cost estimation issues which have been observed in two other projects in the transitional period and four other projects in the beyond price path period. Additionally, the total project-specific adjustment is $405,000 and reflects adjustments to three projects.

The total recommended deduction for systemic issues identified in the beyond price path period (FY25-FY53) that are not captured by annuities assessment is 6.4%. Additionally, the total project-specific adjustment is $959,000 and reflects an adjustment to one project.

Dam Safety Upgrade Projects

Two sample projects were selected for review based on materiality, which amount to 73% of the $540.8 million expenditure for dam safety upgrade works over the FY20 to FY28 period. The review of the dam safety upgrade projects in sample generally show project prudency and efficiency has been appropriately justified and no adjustments have been proposed.

Annuities

Sunwater's original submission of November 2018 ($1092.9 million in $FY19) for transitional and future renewals expenditure i.e. for FY19-FY53 period, was revised through an updated submission in June 2019 ($1043.3 million in $FY19). This had a major effect on the analysis of annuities which now had to compare the original submission with updated submission and redo all previously undertaken analysis with the information in updated submission.

Sunwater's revised submission presented to the QCA in June 2019 includes more than 11,000 individual projects for the schemes under review, for the period from FY21 to FY53. The updated value of annuities in Sunwater's June 2019 submission in FY19 dollars is $65.9 million and $932.0 million for the price path period and beyond price path period respectively.

We sought to undertake the prudency and efficiency review of annuities by investigating several questions related to, in summary, Sunwater's renewal planning practices, accuracy of provided data and by testing the hypothesis that Sunwater is planning for inefficiently renewing assets, the later, by using an investment planning tool.

Due to several issues observed in the provided data, the annuity review is primarily a prudency assessment of renewal activities with regards to project timing.

In consideration of the analysis conducted, we propose a 10% increase in life expectancy, to indicate the potential impact of applying a higher tolerance for risk of failure. In practice, a prudent and efficient infrastructure operator would have developed failure curves based on history for each asset class. The increase in life expectancy is only applicable to replacement activities rather than the identified refurbishment or inspection activities.

Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater's investment planning strategies.

As a result of the applied adjustment to asset lives and hence a delay to renewal activities, the value of the annuity reduces to $59.7 million and $755.6 million for the price path period and beyond price path period respectively.

1.0 Introduction

Sunwater is a government owned corporation that owns and manages a regional network of bulk water supply infrastructure throughout Queensland that supports irrigated agriculture, mining, power generation, industrial and local government.

Sunwater's water storage and distribution infrastructure includes 19 major dams, 64 weirs and barrages, 79 pumping stations, and more than 2500 kilometres of pipelines and water channels.

The Queensland Government has directed the QCA to recommend prices to be charged by Sunwater and Seqwater (the businesses) to irrigation customers in specific water supply schemes (WSSs) and distribution systems[1] for the period 1 July 2020 to 30 June 2024. A copy of the Minister's referral notice (the referral) is available on the QCA's website.[2]

The referral requires that prices allow the recovery of prudent and efficient costs associated with operational, maintenance and administrative activities and renewing existing assets. The allowance for renewals should also account for prudent and efficient expenditure incurred in the previous price path periods. Both businesses are intending to recover renewals expenditure using a rolling renewals annuity calculated with either a 20-year or 30-year planning period.

Costs recovered should include those required to meet regulatory obligations and deliver agreed service levels, where costs to deliver agreed service levels are not materially higher than the costs of like-for-like replacement or modern equivalent replacement.

In relation to dam safety upgrade capital expenditure, the referral requires the QCA to provide two sets of prices: one set that excludes dam safety upgrade capital expenditure, and an additional set that includes an appropriate allowance for dam safety upgrade capital expenditure that is forecast to be incurred from 1 July 2020 onwards.

The QCA engaged AECOM to undertake a desktop review to assist the QCA in determining the prudency and efficiency of Sunwater's historic and forecast renewals expenditure in specified water supply schemes (WSSs), and of forecast capital expenditure on dam safety upgrades.

Numerous information related challenges were experienced during the review including the delay in timely receipt of information, wide-ranging changes to data over the course of the project, significant information gaps in some aspects and generally poor quality of provided information. Interpretation, manual data manipulation and professional judgement were required to make an assessment of prudency and efficiency. To ensure that AECOM was able to support the QCA in meeting the requirements of the ministerial direction, a substantial increase in time and effort was required to overcome these challenges.

1.1 Scope of the Review

The scope of review is defined in the Terms of Reference (ToR), which is available on the QCA's website.[3] The following is a summary of the tasks required by the ToR.

The consultant is required to identify the data, information and access requirements to the businesses' personnel required to undertake the specified tasks, as well as any other tasks the consultant considers may be of benefit.

The tasks required include:

a. A Review of Policies and Procedures

The businesses' policies and procedures as relevant to renewals expenditure, including unit rates adopted and the determination of renewals timing, will be reviewed to determine whether they are likely to ensure a prudent and efficient outcome.

[1] These are set out in Schedule 1 of the referral.
[2] http://www.qca.org.au/Water/Rural/Irrigation-price-investigations
[3] http://www.qca.org.au/Water/Rural/Irrigation-price-investigations

The way in which the businesses addressed the policy and procedures recommendations of QCA's previous irrigation reviews in 2012 (Sunwater) and 2013 (Seqwater) will be reviewed.

Opportunities for improvement will be identified and expected cost savings quantified.

b. Prudency and Efficiency Assessment

The prudency and efficiency of the businesses' historic and forecast renewals expenditure will be reviewed at the scheme / system level and be applicable to each of the schemes / systems. The approach taken should:

- *Consider uncertainty around projects at an early stage of development, and propose suitable methods for dealing with risk and uncertainty (recognising that such projects will have relatively lower levels of documentation than projects at a later stage of development)*
- *Assess the appropriateness of cost escalation methods proposed by the businesses*
- *Assess the potential for efficiency gains and provide appropriate justification*
- *Clearly identify the nature and value of any proposed renewals expenditure considered not prudent or efficient and recommend an alternative timing or cost estimate where necessary.*

On-site assessment of sampled assets is expected and written reasoning, justification and conclusions from the findings are required.

c. Assessment of Renewals Expenditure

For the schemes / systems, assess the prudency and efficiency of:

- *Historical renewals expenditure from previous price path periods up until 30 June 2020, to ensure the opening renewals annuity balances as at 1 July 2020 are based on prudent and efficient expenditure*
- *Forecast renewal expenditure over the proposed planning period.*

This will be done using a representative sample of the renewals expenditure, where the sample will focus on material renewal items and seek to ensure that any inferences drawn from the sample assessment are applicable across un-sampled renewals expenditure.

For each item in the sample, an assessment will be made to:

i. Conclude whether the proposed expenditure is prudent by reviewing:

- *The timing of asset replacement or refurbishment, commenting on the standard run-to-failure asset life and risk-adjusted asset life determined or proposed by the business, explaining any material variations in expected asset lives.*
- *The condition assessments carried out, including the frequency of assessments and results of most recent assessments, and noting any reason to revise condition assessments (with reference to photographic evidence where available).*

ii. Assess whether the proposed expenditure is efficient by reviewing:

- *The proposed refurbishment / replacement cost, commenting on the Bill of Materials, specifically details of item specification (scope and scale), volumes / quantities of key inputs (materials etc.), unit rates for inputs, and the level of indirect cost allowances. Technological change and process redundancy should be taken into account, as well as costs associated with improving general business performance.*
- *Options proposed, and procedures used by the business for determining the least cost or preferred option and commenting on whether the business' approach is appropriate that delivers efficient and least cost outcomes.*

The nature and value of any proposed renewals expenditures considered not prudent or efficient must be identified, and recommendations made to generalise findings across a particular asset class (in all schemes / systems) or to other asset classes.

d. Forecast Dam Safety Upgrade Capital Expenditure during the 2020-24 period

The assessment of the prudency and efficiency of Sunwater's forecast dam safety upgrade capex should consider whether:

- *There is a demonstrated need for the expenditure (prudency), including meeting compliance and regulatory requirements*
- *The proposed design meets technical and regulatory standards and requirements in relation to timing*
- *Sunwater's proposed designs and costings meet the efficiency criteria outlined above.*

1.2 Report Structure

The structure of this report is outlined in Table 1.

Table 1 Report Structure

Main Report	
Section 1	Introduction
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Section 4	Policies and Procedures Review
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Section 7	Annuities Assessment
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Appendix C	Impact on Annuity by Scheme
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Appendix E	Assessment Forms for Historical Renewals
Appendix F	Assessment Forms for Transitional and Forward Renewals
Appendix G	Assessment Forms for Dam Safety Upgrades

2.0 Summary of the Capital Submission

2.1 Renewals

This section summarises Sunwater's historic and forward renewals expenditure.

2.1.1 Historical Actuals (FY12-FY18)

Sunwater's submission includes more than 2,200 individual projects for the schemes under review, for the historical FY12-FY18 period. Sunwater's historic renewals expenditure over the FY12-FY18 period, amounting to $158.1 million, is summarised in Figure 1.

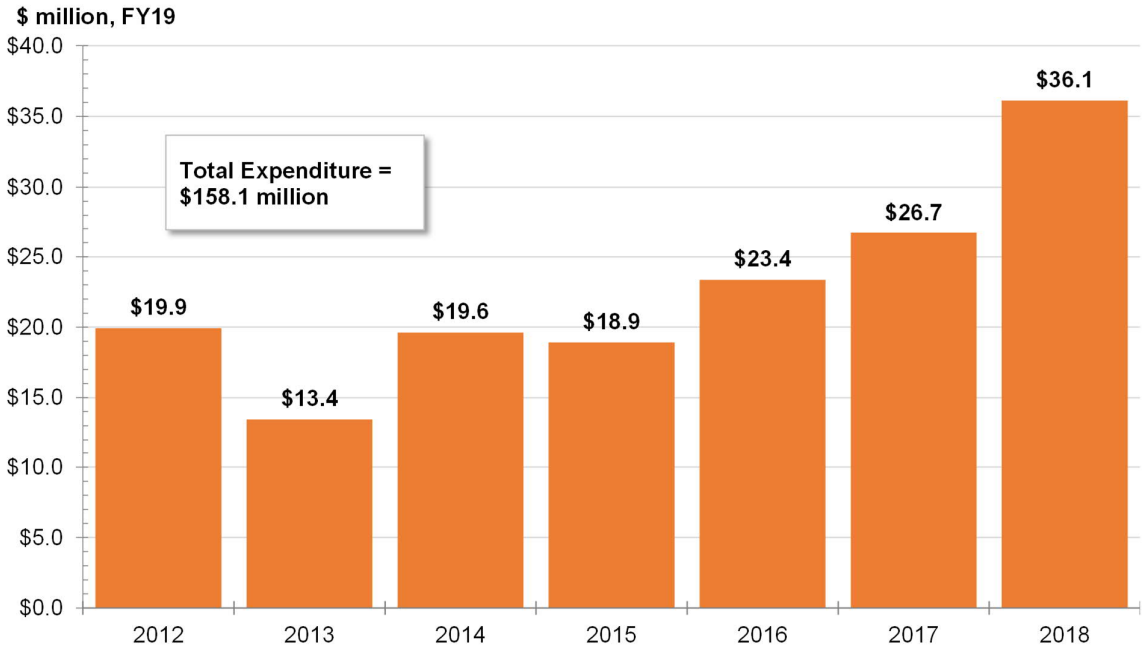

Figure 1 FY12-FY18 Historical Actuals ($ million)

2.1.2 Transitional and Forward Renewals (FY19-FY53)

Sunwater first presented its transitional and forward renewals submission to the QCA in November 2018. That submission was analysed until June 2019, when Sunwater submitted its revised submission for transitional and forward renewals.

Sunwater's submission presented to the QCA in June 2019 includes more than 12,000 individual projects for the schemes under review, for the FY19-FY53 period. Sunwater's forward renewals expenditure over the price path period is presented in Figure 2. The value of works is presented separately for the historical transitional (FY19-FY20), price path (FY21-FY24) and beyond price path (FY25-FY53) periods in $FY19.

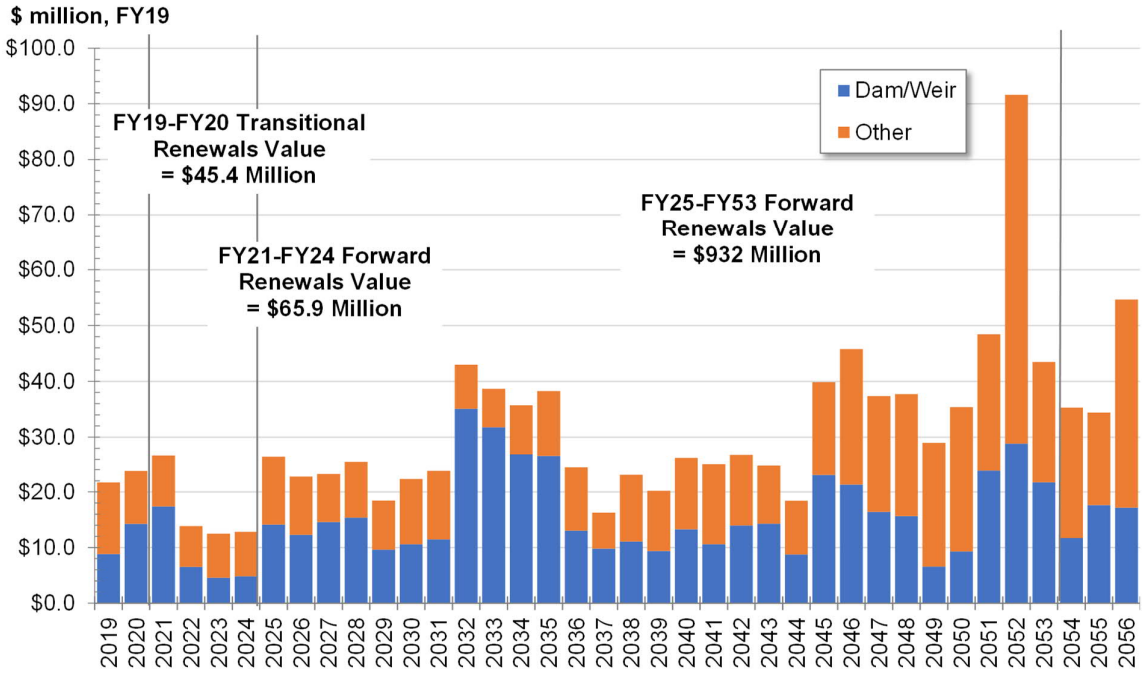

Figure 2 Sunwater's Revised Transitional and Forward Renewals Submission ($ million, FY19)

There is a significant upward trend observed in forward renewals value, driven by renewal activity of long-lived assets. A comparison of Sunwater's revised June forward renewals submission to the original November submission is presented in Figure 3.

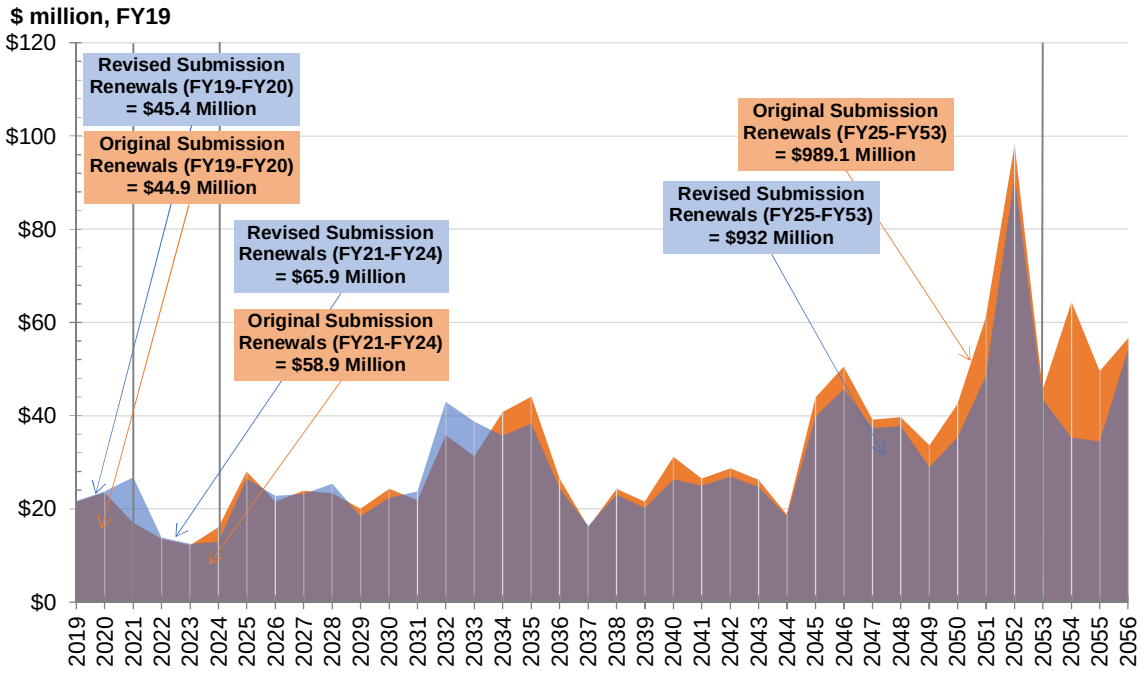

Figure 3 Comparison to Sunwater's Original Transitional and Forward Renewals Submission ($ million, FY19)

Overall, the value of all projects included in Sunwater's transitional and forward renewals submission over the FY19-FY53 period (in $FY19), has decreased from $1,092.9 million in the November 2018 submission to $1,043.3 million in the revised June 2019 submission. For each respective period, the changes are as follows:

- The value of renewals in the historical transitional (FY19-FY20) period has increased from $44.9 million to $45.4 million (in $FY19)
- The total value of forward renewals in the FY21-FY24 period has increased from $58.9 million to $65.9 million (in $FY19)
- The total value of forward renewals in the FY25-FY53 period has decreased from $989 million to $932 million (in $FY19)

Table 2 outlines the top five years of expenditure within the revised submission (and the top project within that year) by value.

Table 2 Top Five Years and Projects by Value ($million, FY19)

	Total FY Value	FY	Project Value	Asset	Project
1	$91.6	2052	$11.7	PETER FAUST DAM	Replace/Refurb: Grout Anchors, Drains, Concrete - stage 2
2	$54.7	2056	$7.4	SOUTH WALSH DISTRIBUTION	Replace Concrete
3	$48.5	2051	$11.7	PETER FAUST DAM	Replace/Refurb: Grout Anchors, Drains, Concrete - stage 1
4	$45.8	2046	$13.5	REDGATE DIVERSION PIPELINE	Replace: Redgate Pipeline (Install & Commission)
5	$43.5	2053	$3.6	EJ BEARDMORE DAM	Replace Gantry Crane 36 T

2.2 Dam Safety Upgrade

Dam safety upgrade works for regulated schemes amount to $540.8 million (in $FY19 terms) over the FY20 to FY28 period. As presented in Figure 4, the two most significant schemes by project value are Burdekin WS and Nogoa WS.

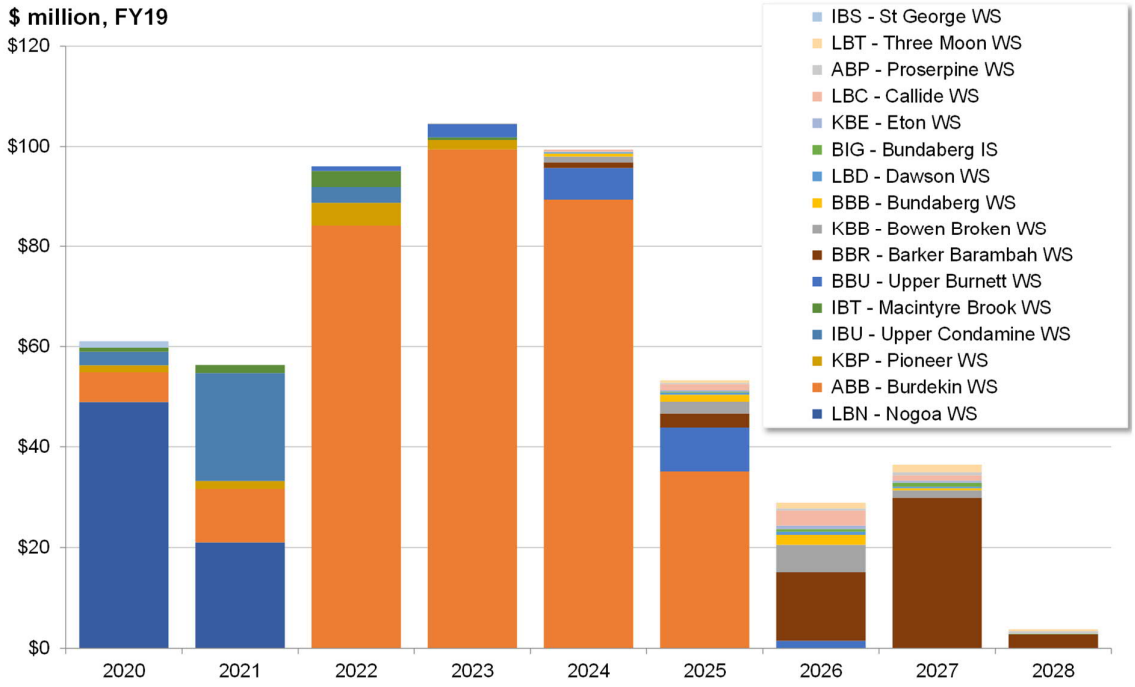

Figure 4 Dam Safety Improvement Upgrade Works by Scheme, FY20-FY28 ($ million, FY19)

3.0 Assessment Methodology

This section outlines the assessment methodology, including the objectives of the review, the approach to the review, priority areas to be reviewed, a description of the project sample, our project assessment approach, and options for extrapolation of findings.

3.1 Objective

QCA engaged AECOM to undertake a desktop review to assist the QCA in determining the prudency and efficiency of Sunwater's historic and forecast renewals expenditure in specified water supply schemes (WSSs), and of forecast capital expenditure on dam safety upgrades.

AECOM was required to:

- Review Sunwater's submissions on proposed renewals and dam safety upgrade capex, and assist the QCA in identifying additional information required
- Review the Sunwater's policies and procedures for renewal expenditure
- Assess the prudency and efficiency of proposed capital projects including
    - Renewals expenditure in previous price path periods up until 30 June 2020
    - Forecast renewals expenditure during each business' proposed planning period
    - Sunwater's dam safety upgrades during the period 1 July 2020 to 30 June 2024

The ToR includes the following definitions of prudency and efficiency to be used in the review:

Prudency — Expenditures are considered prudent when there is an identified need or cost driver (agreed service levels, a legal or compliance obligation or a regulatory obligation). Prudency of project timing will also be assessed in order to determine whether the least whole-of-life cost approach has been taken to deliver the required levels of service.

Efficiency — Expenditures are efficient if they represent the least-cost means of providing the requisite level of service. This assessment includes determining whether:

- The scope of the works is the best means of achieving the desired outcomes
- The standard of the works conforms with technical, design and construction requirements in legislation, industry and other standards
- The cost of the defined scope and standard of works is consistent with conditions prevailing in the markets for engineering, equipment supply and construction.

3.2 Priority Areas

In conducting the assessment, AECOM addressed the following priority areas across the major asset categories:

- Confirmation that asset renewal strategies were implemented appropriately
- Separation of dam safety upgrade projects from asset renewals
- Separation of flood damage related projects from asset renewals
- Identification and separation of legacy costs for dam safety upgrade projects (for example costs related to addressing original design defects)
- Stronger emphasis of review on projects in the price path period
- Lesser emphasis on projects beyond the price path period (relative to projects in the price path period) due to the inherent uncertainty in the project scope and cost

- Assessment of the adequacy of asset management and planning taking into account the extent to which the QCA recommended improvements from the previous review have been implemented
- Identification of systemic issues that necessitate adjustments to the broader renewals program, particularly in relation to flood damage projects

3.3 Approach

A sampling approach was adopted for this assessment of Sunwater's capital expenditure due to the high number of projects contained in Sunwater's submission, and the limited number of projects able to be reviewed at the required level of depth in the required time frame. The sample of projects selected for assessment and the methodology employed in selecting the project sample is outlined in Section 3.8.

The selected sample of projects was evaluated using the methodology summarised in Figure 5.

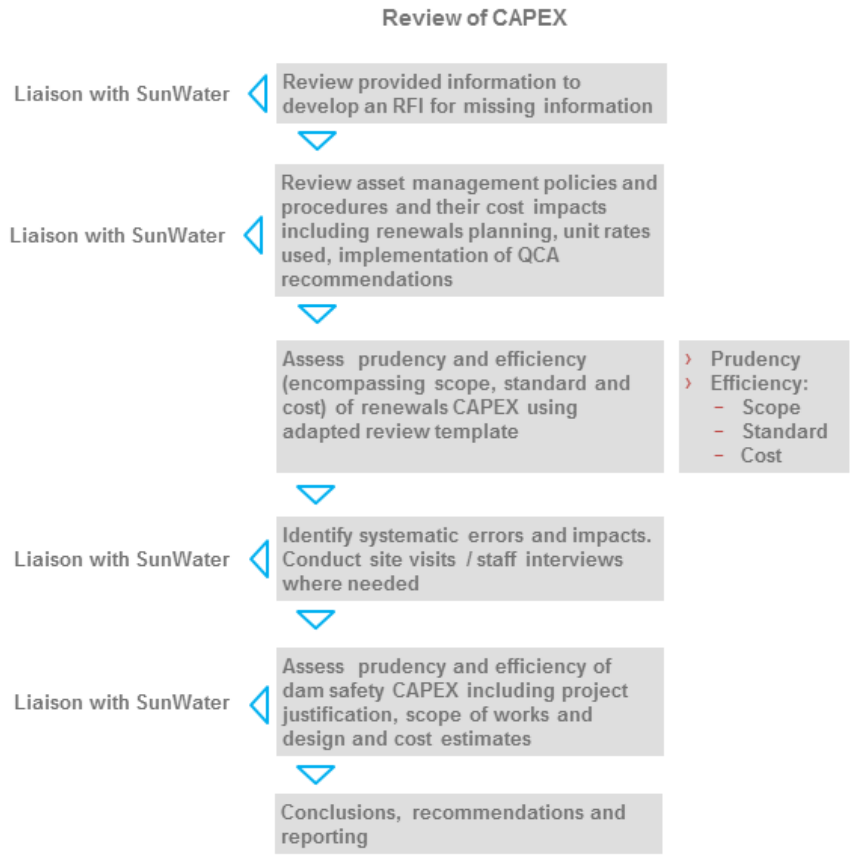

Figure 5 Outline of Methodology

3.4 Project Assessment

A standard project assessment template was developed for use by our team of reviewers to ensure consistency of the technical assessment by all reviewers. The template was structured to address all items required by the terms of reference for the review and constructed to ensure that all issues that could influence a decision on prudency or efficiency were included.

The template included questions on technical topics, questions on cost estimating and cost control, and questions on project governance and implementation, each subject intended to be addressed by a relevant, qualified assessor (as indicated in the tables below).

The templates themselves were reviewed by the core study team with a view to extracting any themes or common issues that could represent systemic issues.

Prudency Assessment	
For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it: - is required to deliver agreed service levels - results from a legal or compliance obligation - is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

Efficiency Assessment	
For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.	
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process? Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available? Were/are non-capex options considered (such as operational solutions)? Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals? Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents? Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance. Was/is the incurred/proposed cost reasonable for the scope of the project? Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why? Was/is the allowance for indirect costs reasonable for the scope of the project? Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development? Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends) Were options considered in determining the least cost or preferred option? Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes? Did the project consider whole of life costs, including future maintenance and operating costs? Have any potential efficiency gains been identified?

3.5 Information Sources

This review has primarily been a desktop review, with requests for additional documentation to clarify issues in relation to the policies, procedures and projects being reviewed. Each of the projects in the review sample has been evaluated for prudency in terms of scope, standard and cost, and recommendations made based on:

- Review of project documentation provided by Sunwater and supplemented by request for information (RFI) process
- Interviews with key Sunwater staff to obtain evidence to further support a recommendation where documentation did not provide sufficient clarity and where deemed necessary
- The professional judgement of the technical reviewers

The use of project documentation is the preferred and best practice, but not the sole means of evaluating project prudency. In general, the type of information reviewed for historical or ongoing projects included, but was not limited to:

- Documents identifying project needs such as business cases
- Documents identifying selection of appropriate scope such as feasibility studies, options assessments

- Documents identifying selection of appropriate standards of work such as concept design reports, detailed design reports
- Documents showing quality of project execution such as project scoping documents, project management plans, risk assessments
- Documents showing how works were procured such as procurement plans, bid evaluations, offer recommendation reports
- Cost documentation at all stages of the project
- Documents showing how the project was executed including as-built drawings, photographs, and project closeout reports

In general, the type of information reviewed for forward projects included, but was not limited to:

- Early planning documents such as business cases, options studies, cost estimates, etc.
- Policies and planning documentation such as asset renewal strategies, asset management plans, maintenance strategies
- Data from the asset register such as asset type, start-up date, and asset replacement cost
- Condition and risk assessments

We have assessed the suitability (in terms of quality and range) of the documentation provided by Sunwater for each project in the sample. A colour-coded scoring system (using shades of green) is used to easily indicate the degree to which existing documentation has enabled an assessment to be made on each project; and highlight where documentation could be improved for future reviews and for better internal project controls (Table 3). In summary:

- The quality of documentation is high where the documentation alone was sufficient to make sound recommendations. This rating indicates that all information required to make the recommendation was documented and available, to a sufficient level of quality.
- The quality of documentation is medium where there was insufficient quantity and range, but when supplemented by interviews, informal documentation and/or professional judgement, supported a conclusion of prudency.
- The quality of documentation is low where the documentation provided was inadequate in range or quality, and our reviewers were reliant on professional judgement to make sound recommendations.

Table 3 Project Documentation Assessment

Quality and range of documentation	Legend	Description
High		Sufficient documentary evidence to support and demonstrate a recommendation
Medium		Incomplete documentary evidence, but interviews, informal documentation and/or professional judgement support a recommendation
Low		Limited documentary evidence, but professional judgement supports a recommendation.

3.6 Interpreting this Report

An example of a review summary for a project is provided in Table 4. The prudency assessment, and efficiency assessment comprising of scope, standard and cost are denoted by ticks or crosses. The colours of the cells indicate the level of documentation quality for the assessment.

Table 4 Sample Project - Interpreting the Report

Project	Prudency Asessment	Efficiency Asessment			Claim ($ millions)		
		Scope	Standard	Cost	Claim	Adjust.	Accepted
Review summary	✔	✔	✔	✘	$0.64	$0.04	$0.6

In the example, the project is found to be:

- Prudent, supported by a high level of documentation quality
- Efficient in scope supported by a medium level of documentation quality
- Efficient in standard supported by a medium level of documentation quality
- Not efficient in cost supported by a medium level of documentation quality

In addition, the inefficient project cost has resulted in a recommendation for $0.4 million to be removed from the accepted value of the claim.

3.7 Extrapolating Findings

If systemic issues are found in the review, these issues may be able to be extrapolated to the wider population of projects. A summary of the types of inefficiencies that may be encountered, and how they may be extrapolated is provided in Table 5.

Table 5 Possible Forms of Inefficiency

Type of Inefficiency Identified	Examples	Extrapolation
Organisation-wide – inefficiencies that are found within the organisation's policies or processes which will likely impact the entire sample.	Procurement process Cost estimating processes Capital planning model	Organisation wide inefficiencies should be applied to the whole sample.
Scheme-wide – inefficiencies found within the planning for a certain scheme or schemes.	Differences found in the planning processes between schemes. (considered unlikely as most planning is performed from central location)	Scheme wide inefficiencies to be applied to the specific scheme/s.
Asset type-wide – Inefficiencies found within the planning documentation for a certain type of asset.	ACP for Pipes - planning or delivery processes. Design issues	Asset type related inefficiencies should be applied to the same asset types in the population.
Project type – inefficiencies found that are linked to the type of project.	For example, metering replacements, dam inspections Design issues	Project type related inefficiencies should be applied to the project type, e.g. metering replacements.
Specific project – specific issues associated with an individual project.	Cost overruns due to project management (historical projects). Over-scoped project.	No extrapolation. Project application only

3.8 Sample of Projects Selected for Assessment

This section outlines the sample of projects selected for assessment and methodology employed in selecting project sample.

3.8.1 Historical Sample

Sunwater's submission includes more than 2,200 individual projects for the schemes under review (consolidated by project ID), for the historical FY12-18 period.

We observed significant variation between Sunwater's actual expenditure to both Sunwater's proposed capital expenditure for the period and the QCA's accepted values. The primary driver of these exceedances appears to be flood damage repair costs associated with major weather events across the period. This, along with flood damage works representing a different nature of project, led us to separately identify flood damage projects from other historical renewal projects for sampling purposes.

Sample Review - Flood Damage Projects

The historical period saw flood damage affect a number of schemes:

- Boyne Supply
- Bundaberg Supply
- Upper Burnett Supply
- Callide Supply
- And to a lesser extent (in order of project value); Bundaberg Distribution, Three Moon Supply, St George Supply, Barker Barambah Supply, Dawson Supply, Lower Fitzroy Supply, Nogoa Supply, St George Distribution, Proserpine Supply, Bowen Broken Supply, Pioneer Supply, Burdekin Distribution, Lower Mary Supply, Eton Distribution, Upper Condamine Supply, Lower Mary Distribution, Emerald Distribution, Eton Supply, Dawson Distribution and Burdekin Supply

To identify systemic issues in the flood damage projects, we sought to review Sunwater's management of the flood works to identify any inefficiencies with the process and extrapolate these findings where appropriate.

The objectives of our sampling approach are:

- The sample should focus on those schemes most affected by flood damage
- The sample should show sufficient representation of value of the total flood damage costs

In developing the sample, we developed an initial short list of 11 projects representing high value projects at schemes that incurred significant flood damage costs

Table 6 demonstrates the percentage of each scheme's value sampled for historical period, for the final flood damage project sample. Figure 6 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects. Flood damage projects have been identified from the historical submission as those projects with a program description of *'Flood Damage'*[4], and consolidated by project ID.

[4] Projects with a program description of '*FD Flood Damage'*, '*NR FLO Flood Damage Repairs'* '*NR FLO Flood Damage Inspection'* and '*NR FLO Flood Damage Operations'* classified as flood damage projects.

Table 6 Original Short-Listed Historical Flood Damage Repairs Sample by Scheme ($'000s, actual)

Scheme		Number of Projects	Number of Projects in Sample	FY12-FY18 Total	FY12-FY18 Total of Selected Projects	Percentage Sampled
WABB	Burdekin Supply	2		$17		
WABP	Proserpine Supply	2		$225		
WBBB	Bundaberg Supply	18	1	$14,279	$8,313	
WBBL	Lower Mary Supply	6		$123		
WBBR	Barker Barambah Supply	8	1	$760	$387	
WBBU	Upper Burnett Supply	17	1	$3,115	$2,332	
WBBY	Boyne Supply	6	2	$38,921	$37,220	96%
WIBH	Chinchilla Weir Supply					
WIBM	Maranoa Supply					
WIBN	Cunnamulla Weir Supply					
WIBS	St George Supply	4	1	$962	$639	66%
WIBT	Macintyre Brook Supply					
WIBU	Upper Condamine Supply	7		$104		
WKBB	Bowen Broken Supply	6		$173		
WKBE	Eton Supply	4		$49		
WKBP	Pioneer Supply	5		$171		
WLBC	Callide Supply	13	1	$2,876	$2,080	
WLBD	Dawson Supply	5	1	$713	$165	
WLBF	Lower Fitzroy Supply	3	1	$679	$494	73%
WLBN	Nogoa Supply	6	1	$451	$229	51%
WLBT	Three Moon Supply	5	1	$1,009	$589	
WMBM	Mareeba Supply					
WAIE	Burdekin Distribution	9		$154		
WBIC	Lower Mary Distribution	6		$89		
WBIG	Bundaberg Distribution	11		$1,098		
WIIS	St George Distribution	5		$387		
WKIA	Eton Distribution	6		$106		
WLIT	Dawson Distribution	5		$44		
WLIW	Emerald Distribution	7		$71		
WMIM	Mareeba Distribution					
Total		**166**	**11**	**$66,576**	**$52,448**	

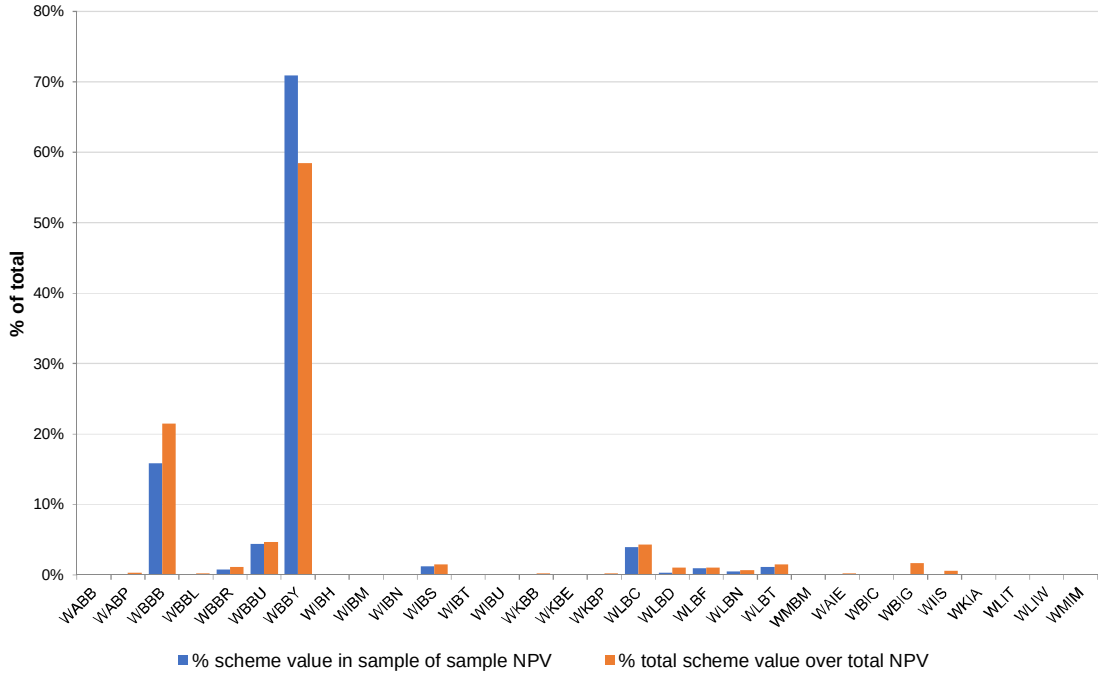

Figure 6 Original Short-Listed Historical Flood Damage Project Sample by Scheme ($'000s, actual)

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Of these 11 short-listed projects:

- For '*12BYR17 Spillway Repairs - Boondooma Dam*', which had an actual expenditure of $36.6 million over the FY12-FY18 period (representing approximately 62% of the value of flood damage repairs over the period), Sunwater advised on 7 May 2019 that it is '*unable to provide the documentation in relation to Boondooma Dam as the material is the subject of client legal privilege*'. We note that this project is subject to an on-going insurance claim and so the cost, net of insurance revenues received, is unclear at this time.
- Six other projects are not being reported as they are subject to on-going insurance claims and so the cost, net of insurance revenues received, is unclear at this time.

Due to issues of this type, the final sample consisted of four flood damage projects. Table 7 demonstrates the percentage of each scheme's value sampled for historical period, for the final flood damage project sample. Figure 7 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

Due to the type of issues as discussed above with regards to the review of high-value projects, some schemes appear to be under-represented in terms of historical flood damage projects.

Table 7 Final Historical Flood Damage Project Sample by Scheme ($'000s, actual)

Scheme		Number of Projects	Number of Projects in Sample	FY12-FY18 Total	FY12-FY18 Total of Selected Projects	Percentage Sampled
WABB	Burdekin Supply	2		$17		
WABP	Proserpine Supply	2		$225		
WBBB	Bundaberg Supply	18		$14,279		
WBBL	Lower Mary Supply	6		$123		
WBBR	Barker Barambah Supply	8		$760		
WBBU	Upper Burnett Supply	17		$3,115		
WBBY	Boyne Supply	6	1	$38,921	$591	2%
WIBH	Chinchilla Weir Supply					
WIBM	Maranoa Supply					
WIBN	Cunnamulla Weir Supply					
WIBS	St George Supply	4	1	$962	$639	66%
WIBT	Macintyre Brook Supply					
WIBU	Upper Condamine Supply	7		$104		
WKBB	Bowen Broken Supply	6		$173		
WKBE	Eton Supply	4		$49		
WKBP	Pioneer Supply	5		$171		
WLBC	Callide Supply	13		$2,876		
WLBD	Dawson Supply	5		$713		
WLBF	Lower Fitzroy Supply	3	1	$679	$494	73%
WLBN	Nogoa Supply	6	1	$451	$229	51%
WLBT	Three Moon Supply	5		$1,009		
WMBM	Mareeba Supply					
WAIE	Burdekin Distribution	9		$154		
WBIC	Lower Mary Distribution	6		$89		
WBIG	Bundaberg Distribution	11		$1,098		
WIIS	St George Distribution	5		$387		
WKIA	Eton Distribution	6		$106		
WLIT	Dawson Distribution	5		$44		
WLIW	Emerald Distribution	7		$71		
WMIM	Mareeba Distribution					
Total		**166**	**4**	**$66,576**	**$1,953**	

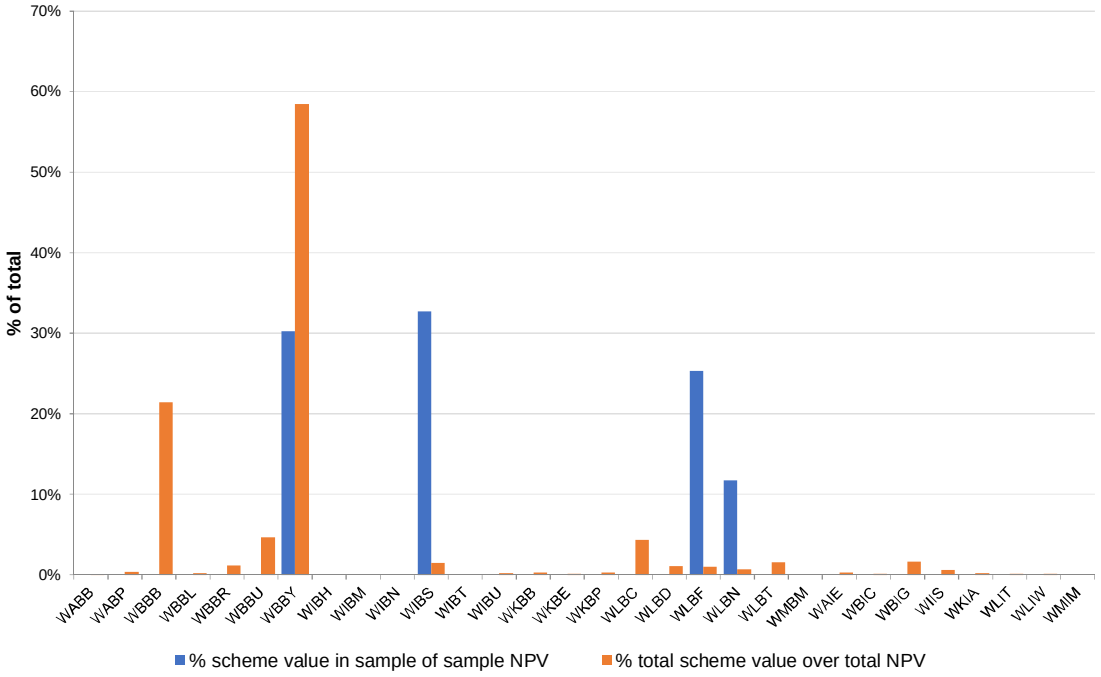


Figure 7 Final Historical Flood Damage Project Sample by Scheme

Sample Review - Remaining (Non-Flood Damage) Historical Projects

The historical period saw some schemes significantly exceed the amounts recommended by the QCA, while others' costs were within or very close to the budgeted amounts. It is important for the focus to be placed on those schemes which see substantial cost exceedances.

The objectives of our sampling approach are:

- The sample should focus on those schemes most affected by cost overruns
- These schemes should see sufficient representation

We identified schemes that saw significant cost exceedances to the QCA-recommended amounts for the period. We sought to ensure that these schemes were adequately represented, which meant that there would be over-representation in those schemes and under-representation in others.

Table 8 demonstrates the percentage of each scheme's value sampled for historical period, excluding flood damage projects. Figure 8 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

Table 8 Sample Analysis by Scheme, Other Historical Projects ($'000s, actual)

Scheme		Number of Projects	Number of Projects in Sample	FY12-FY18 Total	FY12-FY18 Total of Selected	Percentage Sampled
WABB	Burdekin Supply	76		$4,582		
WABP	Proserpine Supply	39	1	$1,653	$607	37%
WBBB	Bundaberg Supply	99		$3,463		
WBBL	Lower Mary Supply	16	1	$621	$387	62%
WBBR	Barker Barambah Supply	53		$897		
WBBU	Upper Burnett Supply	73		$2,193		
WBBY	Boyne Supply	33		$777		
WIBH	Chinchilla Weir Supply	10		$127		
WIBM	Maranoa Supply	2		$5		
WIBN	Cunnamulla Weir Supply	5	1	$61	$26	43%
WIBS	St George Supply	76		$4,953		
WIBT	Macintyre Brook Supply	53	1	$2,059	$283	14%
WIBU	Upper Condamine Supply	86		$2,750		
WKBB	Bowen Broken Supply	65	1	$2,009	$408	20%
WKBE	Eton Supply	58		$3,108		
WKBP	Pioneer Supply	77	2	$4,498	$1,428	32%
WLBC	Callide Supply	63	1	$5,840	$1,546	26%
WLBD	Dawson Supply	63	1	$2,117	$261	12%
WLBF	Lower Fitzroy Supply	15	1	$467	$139	30%
WLBN	Nogoa Supply	95	1	$6,047	$732	12%
WLBT	Three Moon Supply	28		$581		
WMBM	Mareeba Supply	33	1	$1,976	$480	24%
WAIE	Burdekin Distribution	270	1	$11,676	$767	7%
WBIC	Lower Mary Distribution	27		$894		
WBIG	Bundaberg Distribution	271	1	$9,494	$1,273	13%
WIIS	St George Distribution	44		$3,843		
WKIA	Eton Distribution	147	1	$3,636	$968	27%
WLIT	Dawson Distribution	39		$1,682		
WLIW	Emerald Distribution	59		$3,463		
WMIM	Mareeba Distribution	149	2	$6,052	$1,313	22%
Total		**2124**	**17**	**$91,524**	**$10,618**	

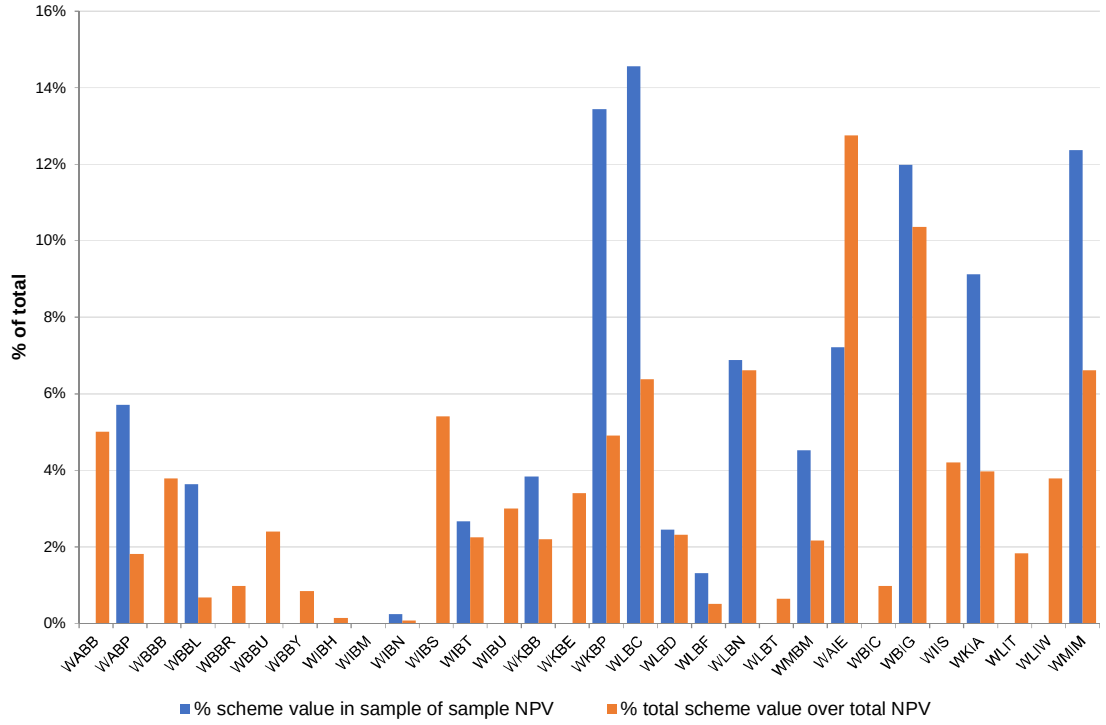


Figure 8 Sample Analysis by Scheme, Other Historical Projects

A total of 21 historical projects (4 flood damage and 17 other projects) were included in the historical review sample. These represent 2.9% of flood damage and 11.6% of other historical expenditure over the FY12-FY18 period (Table 9).

Table 9 Summary of Historical Sample ($'000s, actual)

Flood Projects	
Number of Projects in the Planning Period	166
Number of Projects in Sample	4
% Projects by Number	**2.41%**
FY12-FY18 Total	$66,576
FY12-FY18 Total of Selected Projects	$1,953
% By value	**2.93%**

Non-Flood Projects	
Number of Projects in the Planning Period	2124
Number of Projects in Sample	17
% Projects by Number	**0.80%**
FY12-FY18 Total	$91,524
FY12-FY18 Total of Selected Projects	$10,618
% By value	**11.60%**

The list of projects included in the sample is provided in Table 10.

Table 10 Historical Project List

Project	Scheme	FY12-FY18 Total ($'000s, Actual)
Flood Damage Projects		
12SGA24 - FD01 (2012) - Moolabah Weir - Dam Break & Upgrade Construction	St George Supply	$639,046
13LFZ07 - FD01 (2012) Eden Bann Repair and Desilt the Fishlock to make it operable after February 2012 flood	Lower Fitzroy Supply	$493,849
12NMA08 - FD01 (2011) Tartrus Weir Flood Damage Repairs - Erosion & Protection Works	Nogoa Supply	$229,417
16BYR07 - Boondooma Dam Spillway Repairs Project Insurance Claim	Boyne Supply	$591,180
Bulk Water and Irrigation Scheme Projects		
16PRO03 - Investigate Spillway Chute Floor - Peter Faust Dam	Proserpine Supply	$607,160
16MVA01 - Reinstate Down Stream Rock Protection - Mary River Barrage (Options/Design 2016)	Lower Mary Supply	$386,652
16CUW02 - Allan Tannock weir - Refurbish Outlet Works Gate	Cunnamulla Weir Supply	$25,903
14MAB05 - Coolmunda Dam: Refurbish Float Wells (Float Guides, Ropes, Tie Rod Ends)	Macintyre Brook Supply	$283,434
17BBR04 - Plug the River Conduit Inlet Tower Base Permanently - Eungella Dam (Options HB#2039445, Cost Est HB#2301154, Construct 2019)	Bowen Broken Supply	$408,257
07PIO05 - Replace Regulating Valve RV01 - Palmtree Creek Pipeline	Pioneer Supply	$955,558
15PIO06 - Teemburra - Replace Control System including SCADA for Teemburra Dam, Palmtree Ck & Tannalo Valves - Teemburra Dam	Pioneer Supply	$472,207
15CVA16 - Callide Flood Review	Callide Supply	$1,545,858
15DAW01 - Upgrade PLC and SCADA System - MOSS Pump Station (Drawings/Spec/Cost Estimate 2015, Supply/Install/Commission 2016)	Dawson Supply	$260,693
12LFZ12 - Replace Control Equipment - Eden Bann Fishway (Scope/Options/Design 2014, Procure/Install/Commission 2015)	Lower Fitzroy Supply	$139,241
13NMA04 - Spillway Seepage Investigations - Fairbairn Dam (Void Repair Report HB#11050369)	Nogoa Supply	$731,843
12MDA57 - Replace lighting system at the Tinaroo Falls Dam Gallery	Mareeba Supply	$480,001
Distribution Scheme Projects		
13BIA48 - FD01 (2013) Flood Damage Repairs - Don Beattie PSTN	Bundaberg Distribution	$1,272,616
11ETO06 - Replace Switchboards and Control Equipment - Brightley Pstn 1 & 2	Eton Distribution	$968,264
14MDA13 - Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2	Mareeba Distribution	$876,952
17BRI31 - Install STG II Functional Outlet Works - Giru Weir	Burdekin Distribution	$766,806
14MDA33 - Study Copper Sulphate Research Project - West Barron Main Channel	Mareeba Distribution	$436,167

3.8.2 Transitional and Forward Renewal Sample

This section presents the adopted sampling methodology and profile of the projects selected for review. Figures presented in this section reflect Sunwater's original November renewals submission, as this was used in determining the review sample. All figures presented in this section are in present value terms, discounted using a nominal WACC of 6.33%[5].

Critical to the selection of projects to be sampled over the transitional, price path period and beyond price path period is the contribution of those projects to the prices charged at a scheme level.

[5] The WACC determined by the QCA in the Seqwater Bulk Water Price Review 2018–21 final determination was 6.33%

With this in mind, we adopted the following guiding principles in our sampling approach:

- The sample should represent, at a scheme level, an appropriate proportion of the value of each scheme's projects, i.e. all schemes should be represented
- The sample should be weighted more heavily towards the transitional and price path period
- Those schemes where there are projected increases in costs (and therefore prices) should be appropriately represented
- The sample should represent an appropriate proportion of the value of the total population of projects
- The sample should allow for identification of systemic inefficiencies and extrapolation of these

An NPV approach was adopted to determine material projects for consideration in the review sample.

Sample Review – Transitional and Price Path Periods

We expect that the nearer term projects (transitional and price path period) will have a higher level of documentation allowing for a more in-depth review and will provide a higher contribution to the NPV.

With this in mind, we aimed to weight the sample towards the transitional and price path period for irrigation and bulk water systems. The sample selection was guided by project materiality, however was manually developed in consultation with the QCA giving consideration to:

- Achieving appropriate representation at the scheme level
- Achieving appropriate representation of different asset types
- Achieving appropriate representation in the type of project assessed (and considering projects for inclusion in the review sample where there are numerous other similar projects in the submission)
- Including projects in the sample where project-specific feedback has been made by stakeholders
- Avoiding potential conflicts of interest

Over 2000 projects in Sunwater's original submission had expenditure occurring in the transitional and price path periods. Of these, 32 projects were included in the final review sample, representing 10.7% of the total present value of projects over period (21.0% of Irrigation/Bulk scheme projects and 1.4% of distribution schemes projects).

Table 11 demonstrates the percentage of each scheme's value sampled for the transitional and price path period. Figure 9 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

We note that for distribution systems, the sample is less weighted toward the transitional and price path periods, due to significant spikes occurring in outer-year expenditure, as discussed at section 3.8.3.

Some changes in the number of projects with expenditure occurring in the transitional and price path period may be observed in our final conclusions presented in Section 6.0 due to Sunwater's submission of a revised program in June, wherein changes in project timing occurred.

Table 11 Sample Analysis by Scheme, Transitional and Price Path Period (NPV, $'000s)

Scheme		Number of Projects	Number of Projects in Sample	Total NPV	NPV of Selected Projects	Percentage sampled
WBBR	Barker Barambah bulk	25		$1,452		
WKBB	Bowen Broken Rivers	30	3	$1,799	$634	35%
WBBY	Boyne River & Tarong	15	1	$977	$335	34%
WBBB	Bundaberg bulk	62	1	$2,473	$297	12%
WABB	Burdekin Haughton bulk	51	2	$1,975	$246	12%
WLBC	Callide Valley	41	2	$2,217	$674	30%
WIBH	Chinchilla Weir	9	1	$479	$64	13%
WIBN	Cunnamulla	4	1	$62	$47	76%
WLBD	Dawson Valley bulk	26	1	$1,699	$460	27%
WKBE	Eton bulk	35	1	$834	$107	13%
WLBF	Lower Fitzroy	2	1	$46	$42	91%
WBBL	Lower Mary River bulk	5		$83		
WIBT	Macintyre Brook	24	2	$658	$248	38%
WIBM	Maranoa River	4		$165		
WMBM	Mareeba-Dimbulah bulk	23	2	$1,287	$418	32%
WLBN	Nogoa Mackenzie (bulk)	60		$2,227		
WKBP	Pioneer River	37	1	$1,283	$116	9%
WABP	Proserpine	13	2	$2,179	$464	21%
WIBS	St George bulk	41		$1,144		
WLBT	Three Moon Creek	16	3	$859	$577	67%
WBBU	Upper Burnett	35	1	$1,695	$323	19%
WIBU	Upper Condamine	40	3	$1,229	$572	47%
WBIG	Bundaberg distribution	472		$9,211		
WAIE	Burdekin Haughton distribution	340		$8,245		
WLIT	Dawson Valley (Theodore) distribution					
WLIW	Nogoa Mackenzie (Emerald) distribution	87		$1,849		
WKIA	Eton distribution	179	2	$2,981	$219	7%
WBIC	Lower Mary River distribution	78	1	$2,838	$191	7%
WMIM	Mareeba-Dimbulah distribution	286	1	$4,896	$22	0%
WIIS	St George distribution					
Total		**2040**	**32**	**$56,840**	**$6,057**	

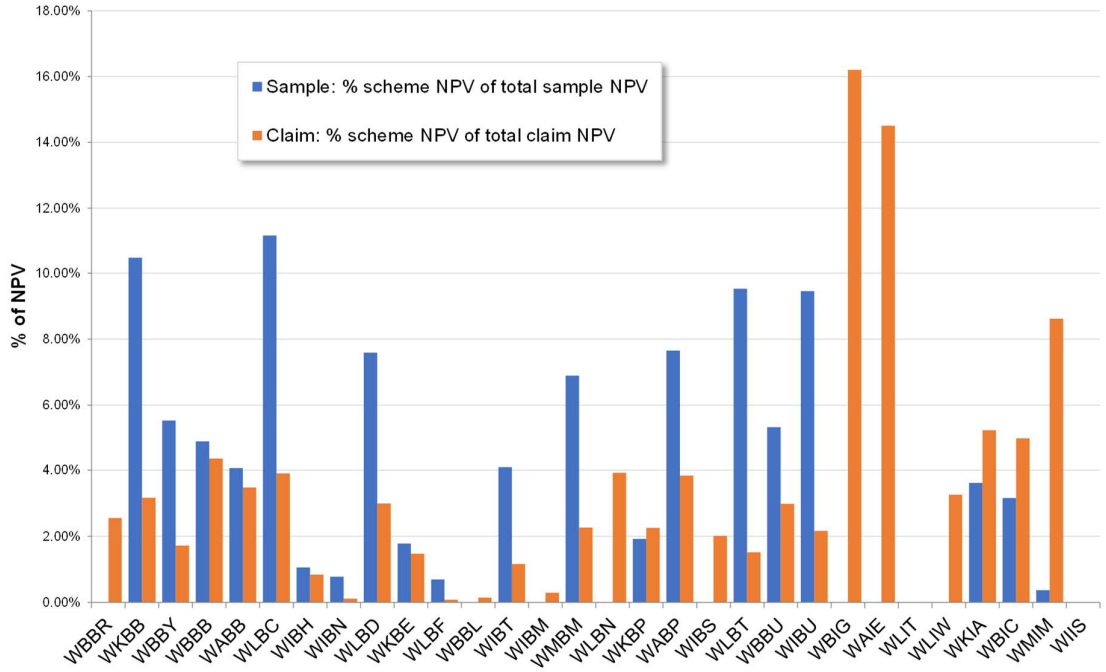


Figure 9 Sample Analysis by Scheme, Transitional and Price Path Period

In undertaking the manual manipulation of the sample in this period, it was important also to ensure appropriate representation at an asset class level. The sample's asset level representation (by value) over the transitional and price path period is presented in Figure 10.

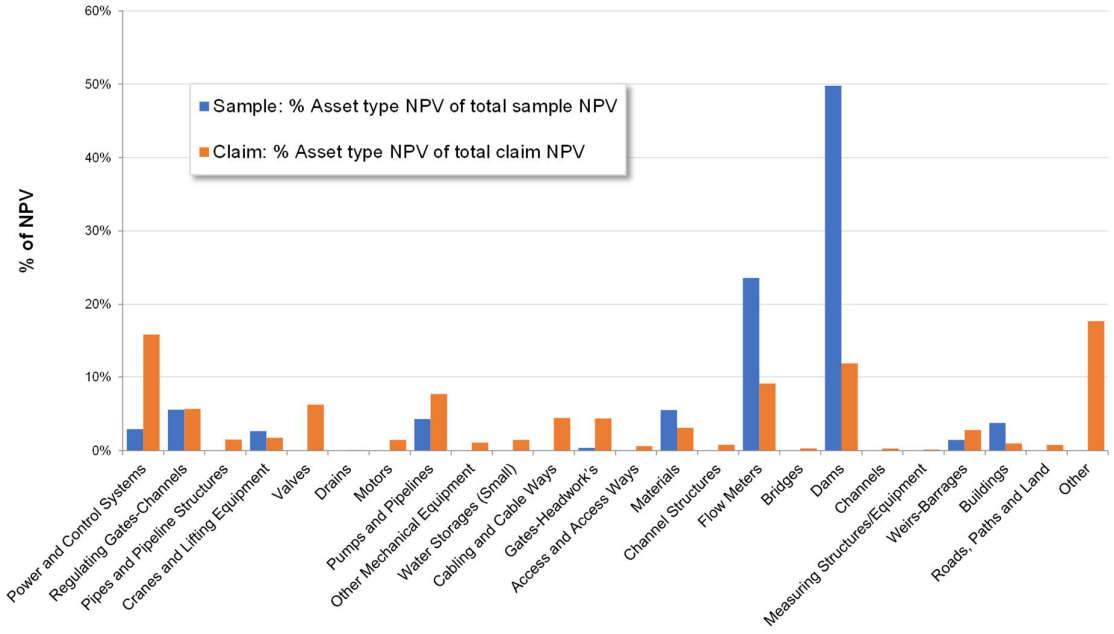


Figure 10 Sample Analysis by Asset Type, Transitional and Price Path Period

The over representation or under representation of particular schemes or asset classes within this period is attributed to the various conflicting considerations in constructing the sample, and the limited number of projects able to be reviewed at the required level of depth in the required time frame.

Sample Review – Transitional, Price Path Period and Beyond Price Path Period

It is noted that Sunwater's planning for projects within the beyond price path period is performed at a portfolio level. We understand that Sunwater uses a business model that determines a long-term capital program based on remaining useful life of its assets. Based on this, it was anticipated that little information or justification will be able to be provided around the scope of works for these projects. For this reason, the assessment of projects in the longer-term planning period was driven by a review of the *process* used by Sunwater to determine this program of works. The sample determined is a means of firstly checking that the process documented is being correctly implemented, and secondly that this process is prudent and efficient.

Another consideration for sampling in the beyond price path period is that some schemes are seeing significant cost rises over this period, whereas others are remaining relatively stable. We have identified those schemes using colour coding below (orange for those seeing costs trending upwards in the long-term period). For schemes where upward trends in renewals costs were identified, we have attempted to ensure adequate representation in those schemes across the period, with a focus on the projects and asset types which appear to contribute to those cost increases.

Over 14,000 projects in Sunwater's original submission had expenditure occurring in the transitional (FY19-FY20), price path (FY21-FY24) and beyond price path (FY25-FY53) periods. 65 projects representing 4.8% of NPV ($FY19) were reviewed. It is to be noted that a number of these projects have expenditure occurring over several years and therefore can fall under one or more of the three periods.

Table 12 shows the make-up of the total sample. Figure 11 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

Table 12 Sample Analysis by Scheme FY19-FY53 (NPV, $'000s)

Scheme		Number of Projects	Number of Projects in Sample	Total NPV	NPV of Selected Projects	Percentage Sampled
WBBR	Barker Barambah bulk	280	3	$19,031	$129	1%
WKBB	Bowen Broken Rivers	267	5	$11,158	$1,071	10%
WBBY	Boyne River & Tarong	137	1	$10,552	$497	5%
WBBB	Bundaberg bulk	475	3	$41,166	$383	1%
WABB	Burdekin Haughton bulk	692	5	$32,639	$791	2%
WLBC	Callide Valley	386	2	$17,181	$1,583	9%
WIBH	Chinchilla Weir	25	2	$1,417	$276	20%
WIBN	Cunnamulla	15	1	$436	$47	11%
WLBD	Dawson Valley bulk	376	1	$16,346	$1,688	10%
WKBE	Eton bulk	312	2	$14,130	$535	4%
WLBF	Lower Fitzroy	67	1	$2,206	$185	8%
WBBL	Lower Mary River bulk	49	1	$1,945	$43	2%
WIBT	Macintyre Brook	176	2	$7,344	$991	13%
WIBM	Maranoa River	17		$689		
WMBM	Mareeba-Dimbulah bulk	172	2	$9,027	$1,319	15%
WLBN	Nogoa Mackenzie (bulk)	573	2	$22,028	$86	0%
WKBP	Pioneer River	307	2	$14,246	$555	4%
WABP	Proserpine	162	2	$8,836	$1,066	12%
WIBS	St George bulk	231	1	$10,444	$43	0%
WLBT	Three Moon Creek	240	3	$10,663	$1,704	16%
WBBU	Upper Burnett	297	2	$12,775	$522	4%
WIBU	Upper Condamine	343	3	$16,363	$1,522	9%
WBIG	Bundaberg distribution	2839	4	$58,237	$1,492	3%
WAIE	Burdekin Haughton distribution	1982	5	$59,287	$2,443	4%
WLIT	Dawson Valley (Theodore) distribution	38		$1,632		
WLIW	Nogoa Mackenzie (Emerald) distribution	433		$13,084		
WKIA	Eton distribution	910	3	$14,523	$410	3%
WBIC	Lower Mary River distribution	331	2	$8,707	$408	5%
WMIM	Mareeba-Dimbulah distribution	2111	5	$51,025	$3,628	7%
WIIS	St George distribution	23		$988		
Total		**14,266**	**65**	**$488,105**	**$23,418**	

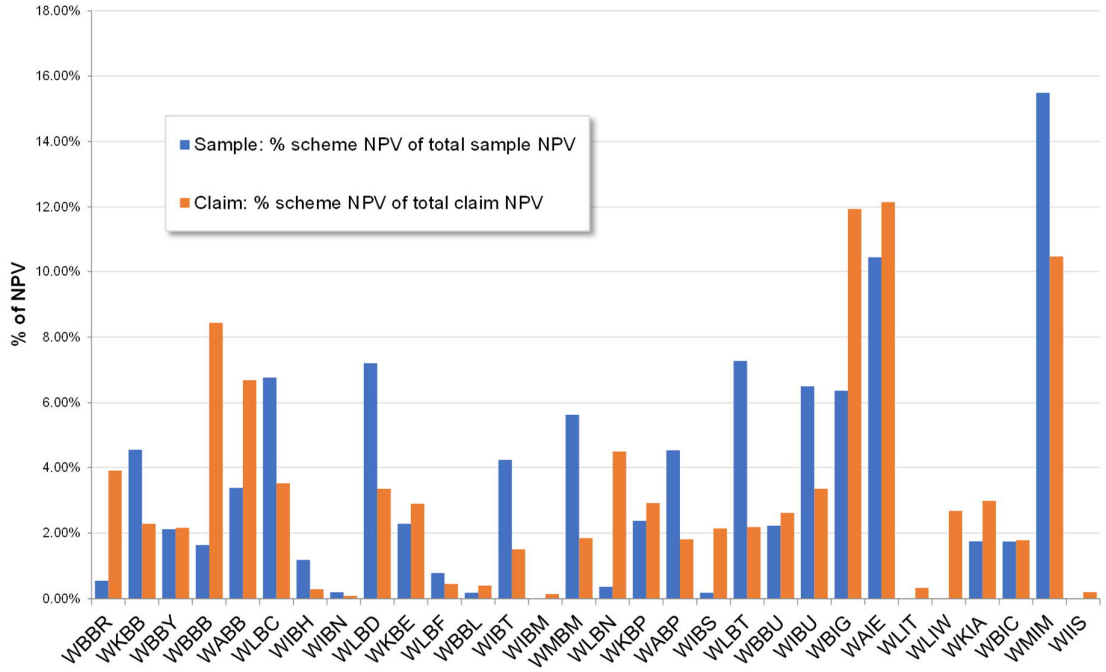


Figure 11 Sample Analysis by Scheme, FY19-FY53

In undertaking the manual manipulation of the sample in this period, it was important also to ensure appropriate representation at an asset level, particularly those assets which appeared to drive increases in costs for the different schemes. The sample's asset level representation (by value) over the transitional and price path period is presented in Figure 12.

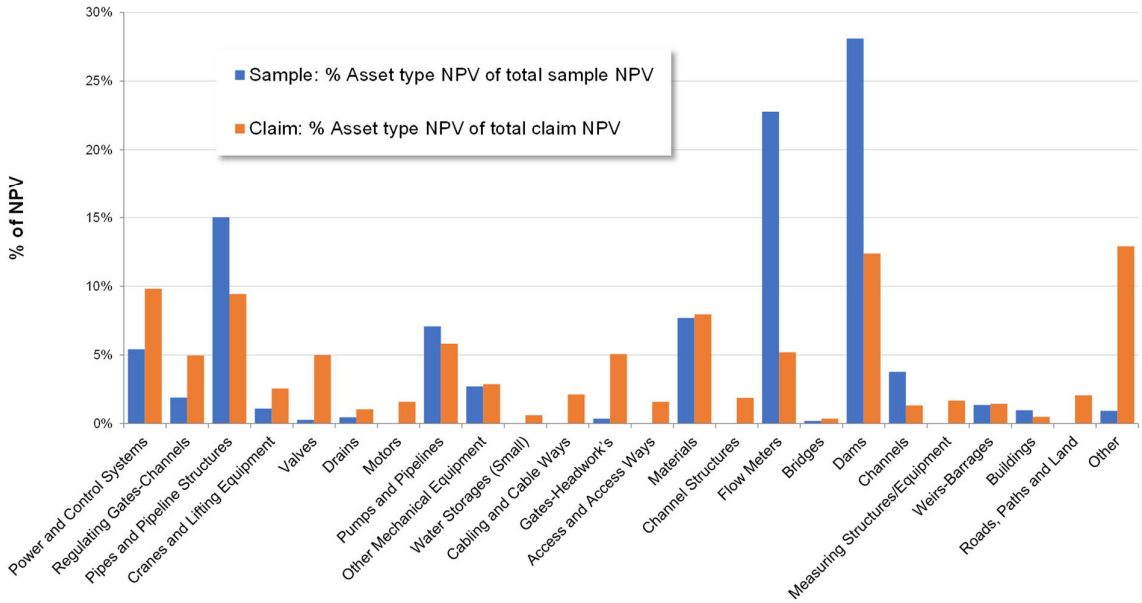


Figure 12 Sample Analysis by Asset Type, FY19-FY53

Similar Projects

One thing to note about Sunwater's list of projects is that there are a number of projects which are very similar in nature and costs. For example, in the Bundaberg bulk Scheme, there are 12 individual projects where the scope of works is '*Build & install 10 new shutters at Ben Anderson Barrage*'.

Where instances like this appear, we have included in the sample only a few of these projects. This has meant that the total value of the sampled projects may appear to be understated. It is noted that distribution systems in particular have many similar projects occurring in outer year periods (such as pump and pipe replacements) which collectively represent high value.

A summary table of some notable instances of this is provided at Table 13, and their impact on the total value sampled.

Table 13 Similar Projects to those in the Forward Renewal Sample

Project Type	Approximate value of Projects in Original Submission	Scheme	Included in Review Sample	Indicative Remaining Value (NPV)
20yr Dam Safety Review	23 projects at an NPV of $5.4 million	Various Bulk Water Schemes	8 projects at an NPV of $3.4 million	$2.0 million
5yr Dam Comprehensive Inspection	45 projects at an NPV of $11.6 million	Various Bulk Water Schemes	7 projects at an NPV of $3.3 million	$8.3 million
Build& install 10 new shutters at Ben Anderson Barrage	12 projects at an NPV of $0.8 million	Bundaberg bulk	2 projects at an NPV of $0.3 million	$0.5 million
Meter replacement	400+ projects at an NPV of $13.7 million	Various	9 projects at an NPV of $6.0 million	$7.7 million
Refurbish pump *(Centrifugal Pump (Pipe size >150mm))*	51 projects at an NPV of $3.6 million	Various	1 project at an NPV of $0.4 million	$3.2 million
Replace pump *(Centrifugal Pump (Pipe size >150mm))*	59 projects at an NPV of $7.3 million	Various	1 project at an NPV of $0.4 million	$6.9 million
Replace Concrete Lining	11 projects at an NPV of $3.2 million	Various Distribution Schemes	1 project at an NPV of $0.4 million	$2.8 million
Replace Pipe *(Reinforced Concrete)*	99 projects at an NPV of $14.6 million	Various Distribution Schemes	2 projects at an NPV of $8.1 million	$6.5 million
Replace Pipe *(High Density Poly Pipe)*	32 projects at an NPV of $3.2 million	Various Distribution Schemes	1 project at an NPV of $0.4 million	$2.8 million
Replace Synthetic Channel Lining	14 projects at an NPV of $2.4 million	Various Distribution Schemes	1 project at an NPV of $0.7 million	$1.6 million
Replace Earth Drain	22 projects at an NPV of $1.1 million	Mareeba-Dimbulah distribution	1 project at an NPV of $0.1 million	$0.9 million
Replace Scour Valve	180+ projects at an NPV of $1.9 million	Various Distribution Schemes	1 project at an NPV of $0.1 million	$1.8 million
			Total Indicative Remaining Value	***$45 million***

Summary

The total sample includes 65 projects representing 4.8% of the total present value of Sunwater's renewals project. This includes 32 projects within the transitional and price path period representing 10.7% of the present value of this period (Table 14). A full list of projects is provided at Table 15.

Some changes in the number of projects with expenditure occurring in the transitional and price path period may be observed in our final conclusions presented in Section 6.0 due to Sunwater's submission of a revised program in June, wherein changes in project timing occurred.

Table 14 Summary of Transitional and Forward Renewals Sample (NPV, $'000s)

FY19-53 Period		Transitional and Price Path Period (FY19-FY24)	
Number of Projects	14,266	Number of Projects	2,040
Number of Projects in Sample	65	Number of Projects in Sample	32
% Projects by Number	**0.5%**	**% Projects by Number**	**1.6%**
Total NPV ($'000s)	$488,105	Total NPV ($'000s)	$56,840
NPV ($'000s) of Selected Projects	$23,418	NPV ($'000s) of Selected Projects	$6,057
% By value	**4.8%**	**% By value**	**10.7%**

Table 15 Transitional and Forward Renewals Sample Project List

Project	Scheme	FY19-FY53 NPV ($'000s)
0000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review -Burdekin Falls Dam	Burdekin Haughton bulk	$211
0000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes $5k for elec. insp.), see notes.	Burdekin Haughton bulk	$451
0000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	Three Moon Creek	$547
0000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	Boyne River & Tarong	$497
0000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	Upper Burnett	$479
0000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	Eton distribution	$103
0000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	Bowen Broken Rivers	$499
0000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020	Pioneer River	$512
0000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec,See notes.)	Mareeba-Dimbulah bulk	$615
0000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	Mareeba-Dimbulah distribution	$83
0000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy ($41,595 / yr) (P2)	Upper Condamine	$796
0000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) -Large cost associated with draining dissipator	Macintyre Brook	$525
0000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	Upper Condamine	$470
0000014241 - MILLAROO IRRIGATION DISTRIB - Replace Concrete Lining	Burdekin Haughton distribution	$419
0000015177 - TOM FENWICK PUMP STATION 1 - Replace H V Switchboards	Burdekin Haughton distribution	$420
0000015210 - TOM FENWICK PUMP STATION 2/3 - Replace Pump No.2	Burdekin Haughton distribution	$581
0000015276 - TOM FENWICK PUMP STATION 4/5 - Replace Reduction Gearbox	Burdekin Haughton distribution	$588
0000015726 - CLARE IRRIGATION DISTRIBUTION - Replace Pipeline 1352.0 - 4307.0	Burdekin Haughton distribution	$436
0000025738 - MONDURAN PUMP STATION - Replace Pump	Bundaberg distribution	$449

Project	Scheme	FY19-FY53 NPV ($'000s)
0000030670 - ISIS DISTRIBUTION - Replace Pipe From 1535.00 To 5250.74M	Bundaberg distribution	$503
0000030689 - DON BEATTIE PUMP STATION - Replace Common Control System STG I	Bundaberg distribution	$497
0000042132 - WEST BARRON DISTRIBUTION - Replace Scour Valve 1275.59M	Mareeba-Dimbulah distribution	$66
0000042159 - WEST BARRON DISTRIBUTION - Replace Pipe Cherry Ck Siphon	Mareeba-Dimbulah distribution	$2,578
0000042409 - WEST BARRON DISTRIBUTION - Replace Syn/Lin Chnl 38142.67-40917.1M	Mareeba-Dimbulah distribution	$794
0000045622 - ARRIGA DRAINAGE - Replace Earth Drain 1845.00-3765.00M	Mareeba-Dimbulah distribution	$108
0000048336 - PETER FAUST DAM - Study: 20yr Dam Safety Rview (by 1 Dec 2023) incl. tasks mentioned in notes	Proserpine	$433
0000048820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	Lower Fitzroy	$185
0000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - ' [redacted] Options Study Review Report' Doc Ref #2242568 Option #4	Eton distribution	$264
0000056272 - TINAROO DAM - Testing of post tensioning permanent strand anchors	Mareeba-Dimbulah bulk	$704
0000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	Lower Mary River distribution	$365
0000057410 - ALLAN TANNOCK WEIR - Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)	Cunnamulla	$47
0000058091 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	Three Moon Creek	$340
0000064409 - KROOMBIT DAM - 20 Dam Safety Review (to be done by 1st June 2020)	Callide Valley	$335
0000064557 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	Eton bulk	$492
0000064960 - LESLIE DAM - Replace Crane Control Equipment	Upper Condamine	$256
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	Three Moon Creek	$817
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	Dawson Valley bulk	$1,688
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	Callide Valley	$1,248
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	Proserpine	$634
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 ($24,052/yr) (P2)	Macintyre Brook	$466
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	Chinchilla Weir	$234
0000067246 - BEN ANDERSON BARRAGE - Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	Bundaberg bulk	$297
0000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattonvale PSTN	Bowen Broken Rivers	$258
0000070052 - EUNGELLA DAM - 19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)	Bowen Broken Rivers	$228
0000072774 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	Pioneer River	$43
0000073006 - KINCHANT DAM - Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake	Eton bulk	$43
0000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	Burdekin Haughton bulk	$43
0000075186 - EUNGELLA DAM - 17BBR04 Eungella Dam - Permanently Isolate River Conduit Intake Tower Base - Refer Opt Sty #2039445 & Cst Est #2301154	Bowen Broken Rivers	$43
0000075187 - GATTONVALE OFF STREAM STORAGE - 17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Conditon Based (Rfr DS Insp Rpt #2288631)	Bowen Broken Rivers	$43

Project	Scheme	FY19-FY53 NPV ($'000s)
0000075493 - OAKENDEN MAIN CHANNEL DISTRIB - 21ETO10 Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA) Control Equip Option Analysis AM11_G04	Eton distribution	$43
0000075973 - BURDEKIN FALLS DAM - 18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)	Burdekin Haughton bulk	$43
0000075990 - OWANYILLA PUMP STATION - 24LOW03 Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)	Lower Mary River distribution	$43
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	Bundaberg bulk	$43
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	Upper Burnett	$43
0000076177 - BEN ANDERSON BARRAGE - Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	Bundaberg bulk	$43
0000076200 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1	Barker Barambah bulk	$43
0000076201 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 2	Barker Barambah bulk	$43
0000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review - Burdekin Falls Dam (2018-2020 Project)	Burdekin Haughton bulk	$43
0000076329 - SYSTEM - 24BIA20 Isis System - Refurbish - BIA-ISIS - ISIS - Irrigation Common Strategy Concrete Ch (30Yr Pln) (Item 2.0)	Bundaberg distribution	$43
0000076370 - FAIRBAIRN DAM - Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.	Nogoa Mackenzie (bulk)	$43
0000076381 - SYSTEM - 16BAL12 Beardmore Dam - Thurragi Channel Repair	St George bulk	$43
0000076554 - CHINCHILLA WEIR - Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir	Chinchilla Weir	$43
0000076580 - FAIRBAIRN DAM - Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)	Nogoa Mackenzie (bulk)	$43
0000076581 - BJELKE-PETERSEN DAM - Study: Bathymetric survey of BjelkePetersen Dam (ELT directive - see notes)	Barker Barambah bulk	$43
0000076609 - MARY BARRAGE - 16MVA01 Reinstating D/S Rock protection - Mary Barrage	Lower Mary River bulk	$43

3.8.3 Dam Safety Upgrade Project Sample

Dam safety improvement works occurring in regulated schemes over the FY2020 to FY2028 period amounts to $540.8 million, as presented in Figure 13. Two sample projects have been selected for review based on materiality, which amount to 73% of dam upgrade works over the period by value.

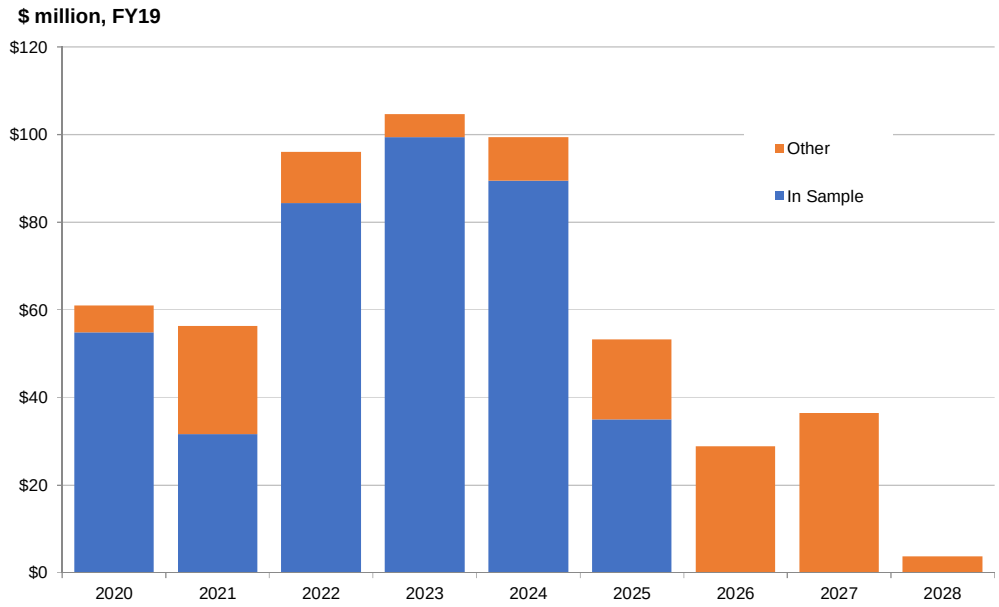


Figure 13 Dam Safety Upgrade Projects, FY20-FY28 ($ millions, FY19)

Burdekin (Burdekin WS) and Fairbairn (Nogoa WS) dam upgrade works are outlined separately in Figure 14.

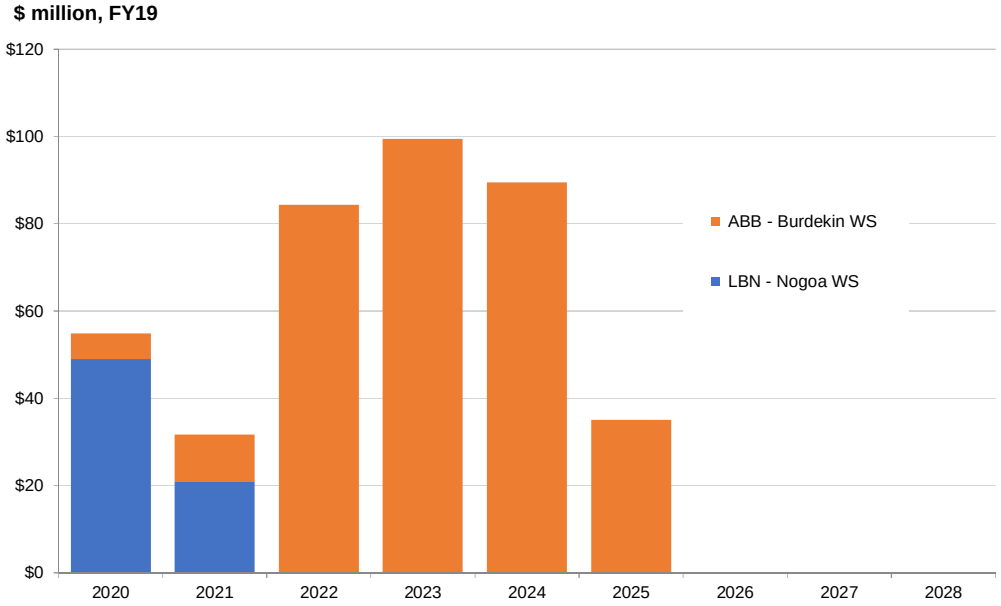


Figure 14 Dam Safety Upgrade Sample Profile ($ millions, FY19)

4.0 Policies and Procedures Review

This section reviews Sunwater's policies and procedures as relevant to renewals expenditure, to determine whether they are likely to ensure a prudent and efficient outcome. This section considers Sunwater's current policies and procedures in relation to recommendations related to policies and procedures made by the QCA in its review of Sunwater's Irrigation Prices in 2012 and associated issues identified by the QCA's consultants at that time.

4.1 Review of Recommendations from the 2012 Review

A summary of the recommendations related to policies and procedures made by the QCA in its review of Sunwater's Irrigation Prices in 2012 is outlined in Table 16[6].

Table 16 Recommendations made by the QCA in its 2012 Review Relating to Capital Expenditure

Topic	Recommendation	
Improved Planning	1.1	Options analysis for material renewals expenditure (p161)
	1.2	A review of the renewals planning process (p161)
	1.4	Renewals planning period
Annual publication of and consultation on improved NSPs	2.1	Inclusion of the renewals options analysis (p178)
	2.2	Variance reporting and re-forecasting of renewals (p178)
	2.4	Customer consultation on the annual NSPs (p178 & 260)
Improved Cost Allocation	3.4	More appropriate allocation of fixed costs in distribution systems

Sunwater developed an Implementation Plan to address the QCA's recommendations and provided progress reports to outline the status of actions taken in relation to this plan.[7] Its current position in relation to the recommendations is outlined in its Irrigation Price Review Submission.[8]

These recommendations are considered throughout the review of policies and procedures.

4.2 Sunwater's Renewal Planning Processes

Infrastructure assets are intended to deliver one (or more) specified service(s) (such as water storage) and are designed to satisfy specific performance specifications, including statutory or regulatory outcomes (such as safety) as well as level of service requirements (including capacity, reliability, delivery capability, etc.).

The majority of these assets deteriorate with use or age, and the risk of failure to meet the required service levels increases as a result, to a point where the risk of failure becomes unacceptable. A competent infrastructure manager will attempt to predict when assets in each of its asset classes will reach that point, and plan for refurbishment or replacement as appropriate so that minimum service level targets continue to be met.

In the 2012 review, the QCA outlined numerous issues related to Sunwater's renewals planning process and recommended that Sunwater review its renewals planning process in light of these. This recommendation, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 17.

[6] Queensland Competition Authority (2012). *Final Report – Sunwater Irrigation Price Review: 2012-17.* http://www.qca.org.au/getattachment/5fad8dc9-2101-4097-bdc8-d90d25fbfbbb/Sunwater-Irrigation-Price-Review-2012-17-Volum-(1).aspx
[7] Sunwater (2012). *QCA Pricing Practices Recommendations: Sunwater Implementation Plan*
[8] Sunwater (2018). *Irrigation Price Review Submission: Appendix C 2012 QCA recommendations and other issues*

Table 17 Review of the Renewals Planning Process

QCA Recommendation

The Authority recommends that Sunwater undertake a review of its renewals planning process (taking into account the Authority's consultants' suggested improvements).

The suggested improvements made by the Authority's consultants are considered throughout this section, and included recommendations that (amongst other things):

- Sunwater adopt decay curves for different asset types, instead of a standard decay curve. As outlined in Section 4.2.1, decay curves are used to determine the timing of asset refurbishment or renewal based on a prediction of the time in the asset's lifecycle where the risk (or frequency) of failure becomes unacceptable.
- Sunwater improve condition its assessment methods and the quality of condition assessment data
- Sunwater give consideration to the inclusion of options analysis in the planning process
- Sunwater improve its cost estimation methodology and review data contained in its Bill of Materials (BOM)

Original Action Proposed / Taken by Sunwater

Sunwater proposed to review the existing renewals planning framework in light of the improvements made through the options analysis process, customer consultation on NSPs and incorporating appropriate improvements from the suite of suggestions from the QCA's consultants.

In light of recommendations, Sunwater proposed to:

- Continue to use a portfolio approach to estimate long term renewals, and a detailed 12-month works delivery plan at each budget cycle.
- Improve the quality of condition and risk data within Sunwater's Works Management System (WMS).
- Review and develop additional decay curves.
- Continue use of non-invasive testing methods in condition monitoring
- Ensure that condition assessments are completed within the specified maximum frequencies prior to each price review
- Train employees on the administration of refurbishment and enhancement, and condition assessment processes and monitor compliance.
- Train employees on material projects identification and options analysis and implement review processes.
- Address technological improvements for material projects through options analysis
- Update the Bill of Materials (BOM) valuations used in the Works Management System (WMS)
- Apply QCA-approved method of determining and allocating indirect costs and overhead
- Assess operating cost implications as part of the options analysis process
- Amend NSP prototypes to take into account customer feedback in relation to real versus nominal cost reporting, clearer reporting of renewals expenditure and renewals project churn.

Sunwater's Current Position

Changes to Sunwater's proposed approach include:

- Sunwater investigation revealed that there was insufficient information on asset decay to generate additional decay curves.
- Sunwater reported the development of a Workflow Root Cause Analysis Report to identify causes of program changes.

Notable milestones/outcomes include:

- Condition assessments for the majority of bulk water assets were updated in 2015 (80% of assets reported to have an assessment complete, compared to 25% prior).
- Sunwater undertook a revaluation of irrigation system assets in 2016.
- The Cost Allocation Manual was updated in 2018 to increase the transparency of local overhead costs and allocation of corporate support costs to direct expenses.
- NSP prototypes amended to:
  - Present QCA cost targets
  - Express values in nominal terms.

This review of Sunwater's renewals planning processes takes this recommendation, the issues identified by the QCA's consultant's and Sunwater's actions into account.

4.2.1 Best Practice

Some assets are more significant than others to an organisation (in terms of service levels), and generally the organisation will have a lower tolerance of risk for these, and they will therefore be refurbished or replaced earlier than less critical assets.

Assets not regarded as critical may be allowed to deteriorate further before being replaced. In practice, a competent infrastructure manager will attempt to avoid having critical assets by investing in redundancy or having contingency planning in place to minimise the impact of asset failure on service delivery.

Best practice renewal planning is designed to identify the economic optimum for a critical asset, where the total cost of ownership of the asset and the risk cost (due to asset failure) are optimised via an asset management plan that specifies asset maintenance requirements and the service life. This represents an optimisation of level of service requirements, the assessed risk of failure to achieve those, and the funding required and represents the most prudent, cost-effective way to manage the asset.

The timing of asset refurbishment or renewal is based on a prediction of the time in the asset's lifecycle where the risk (or frequency) of failure becomes unacceptable. Projecting asset performance into the future is done by deriving an expected risk of failure of each asset type based on experience gained (and informed by the manufacturer, other users or industry experience), and assuming an ongoing degradation of asset condition reaching an unacceptable condition (risk of failure) at the end of its expected service life.

An example of the risk-based approach is shown in Figure 15, which presents a typical failure curve for cast iron pipes based primarily on history. It should be noted that:

- The life expectancy for the asset class is set at 154 years, which is the median (the age at which 50% of the class is considered to have failed)
- The asset manager uses two standard deviations (in advance of the median) to define the end of life for critical assets, which in this case is 127 years (implying a maximum acceptable risk of failure in this case of approximately 5 in 1000)

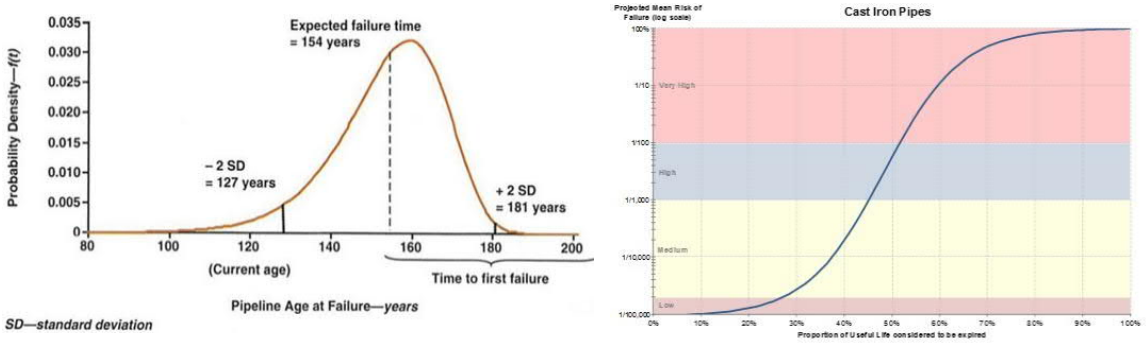


Figure 15 Failure Distribution and Risk of Failure of Cast Iron Pipes

Service life and the rate of deterioration (increase in the risk of failure) typically varies considerably site to site, and curves derived from experience elsewhere are only indicative – there is no substitute for local experience. In the absence of useful local experience, however, the failure curve is often assumed initially to be a normal distribution, and procedures are put in place to revise that assumption based on experience.

Best practice for critical assets (those that have a lower tolerance of failure for business or compliance reasons than others) is that an inspection and maintenance regime is developed to understand actual performance of the assets, and procedures put in place to adjust the expected age of asset failure (the point where the risk of failure becomes intolerable) based on established condition at points during the asset lifecycle.

If a specific asset is established on inspection as being in better condition than expected, the planned service life of the asset will be increased (the renewal will be deferred). As the asset moves through its lifecycle, the accuracy of the planned renewal time should increase as its performance becomes better understood.

The renewal of an asset is allocated to a particular financial year for accounting purposes, but it should be noted that the allocation is based on an assessment of probability, so the actual renewal may occur in an adjacent year.

4.2.2 Renewal Planning by Sunwater

This section examines Sunwater's policies, procedures and practice for renewal planning, with reference to best practice as summarised in Section 4.2.1.

Asset Management Policy

Sunwater's current policy[9] includes statements that refer to customer needs and that require use of a Total Expenditure (TOTEX) approach, defined as the sum of capital and operational expenditures over the whole of the asset life:

- *Manage our assets … considering customer needs and their future requirements*
- *Set asset management procedures … which align to the service targets agreed with our customers …*
- *Ensure asset management is undertaken cost effectively by implementing procedures to cover a TOTEX approach within the asset lifecycle … giving due consideration to the cost of water for our customers, return on assets and margin growth.*

The policy document does not explicitly refer to risk (to service levels) although that is implied by the statements quoted, and there is no reference to the cost of risk (the cost to customers of service interruption). The policy does not refer to or specify a requirement to optimise TOTEX by including the impact of failure on customers and makes no reference to the concept of criticality.

Strategic Asset Management Plan

The requirement under the *Water Act 2000* to prepare a Strategic Asset Management Plan (SAMP) was repealed in 2008, but Sunwater has attempted to remain aligned with industry good practice as defined by ISO55001:2014 and continued to maintain a SAMP. In its SAMP, Sunwater provides asset management objectives in support of its policy document and its strategic objectives and outlines its Asset Management System (AMS).[10]

In the Executive Summary (page 2), the SAMP summarises Sunwater's asset management objectives, and includes these statements:

- *Our assets will be fit for purpose and optimally managed throughout their lifecycle to deliver customer and shareholder value.*
- *We will continually optimise our asset lifecycle and processes to provide efficient delivery of services to customers.*
- *We will fully leverage asset opportunities and realise value improvement across the asset management value chain.*

These are expanded into asset management principles (in Section 4.2), which include (among others):

- *We manage assets to provide value to our customers, stakeholders and shareholders.*
- *We understand our assets including their purpose, criticality, capability, performance, condition and history ...*

[9] Asset Management Policy (doc 1139079), issued February 2019.
[10] Strategic Asset Management Plan, July 2019 – June 2023, dated 6 November 2018

- *We collect and store accurate asset data and make it readily available to all those that require access to it.*
- *We plan for the management of our asset portfolio over the short, medium and long term, to ensure we can deliver on our service commitments into the future, as required.*
- *We consistently manage our assets to have a risk profile that aligns with the Sunwater risk appetite.*
- *We will service, monitor, maintain and replace assets to ensure the ongoing operational performance and service capacity required to meet service standards.*
- *Assets will be refurbished through their service lives, as necessary, to extend service lives as long as economically feasible.*

These statements provide a clear intent to define and adopt the criticality concept, to plan to meet future service commitments, to satisfy a specified risk appetite, and to achieve extended service lives where economically feasible. They also provide intent to achieve a comprehensive understanding of the assets.

The AMS specified in Section 5 has been designed to use a lifecycle approach to asset management which considers whole-of-life implications in relation to customer service targets. On page 17 Sunwater also notes:

> *Sunwater has developed whole of life strategies around the maintenance and replacement of its asset portfolio which is based on the concept of optimised life-cycle cost. Key inputs to the approach are the risk and condition of each asset. The current condition of an asset drives an estimate of the future work required to ensure an asset continues to be able to provide the required level of service into the future, at an acceptable risk. Sunwater maintains a program of asset inspections and condition assessments which continually updates our knowledge of asset condition. This information feeds into the annual review of the renewals program …*

Although there is no specific reference to the use of the cost of risk (the cost to customers of service interruption), we consider that the principles do describe an intent to achieve prudent and cost effective (optimised over whole-of-life) asset management.

Section 6 of the AMS defines roles and responsibilities in relation to asset management. These are listed in some detail, but there appears to be no specific responsibility for optimisation of TOTEX.

Asset Management Plans

Sunwater has developed tactical asset management plans (AMPs) for each service contract that are intended to provide a clear line-of-sight from customer service targets through asset strategies to works programs planned for the service contract. There are also Network Service Plans for each service contract that include financial projections based on the AMP.

The AMPs include minimum acceptable service standards. For example, the Barker Barambah Supply AMP includes a service statement to the effect that *no customer will experience more than 10 unplanned interruptions per water year*.[11] There is no statement of maximum duration of an interruption.

In Section 3.1.2 which addresses Non-Routine works, Sunwater states that its asset planners consider several factors in developing a set of projects for the next financial year, including.

- *Is the work really required? Can it be deferred? Will deferring it result in [an unacceptable] risk of failure or poorer customer service?*

[11] Asset Management Plan – Barker Barambah Supply, dated October 2018

- *What is the best option for the work? Refurbishment, replacement or modified maintenance?*
- *Can the work be aggregated into a larger project for the facility or an asset type program to deliver economies of scale?*
- *Does the work generally align with the lifecycle strategy for the asset?*
- *Can the project or aggregate of projects be achieved within the financial year?*
- *Does the overall expenditure forecast align with the agreed QCA price path? Rationalisation of projects may be required to fit within the price path.*

Sunwater also notes that works planned for more than two years ahead are typically not translated into projects ahead of time, because major weather events and unplanned failures are frequent enough and often significant enough to require major changes to near-future works programs.

Long-Term Renewal Planning Methodology

Sunwater has provided a summary of the methodology used for renewal planning.[12] We note that despite actions taken/proposed by Sunwater, the '*Asset Management Planning Methodology Paper*' is dated February 2011 and has not been updated since.

The methodology includes reference to a 'standard asset condition decay curve' (as shown in Figure 16), for which a formula is provided (with a note to the effect that it was developed in 2006). In 2011, SKM recommended that Sunwater adopt decay curves for different asset types, instead of a standard decay curve.[13]

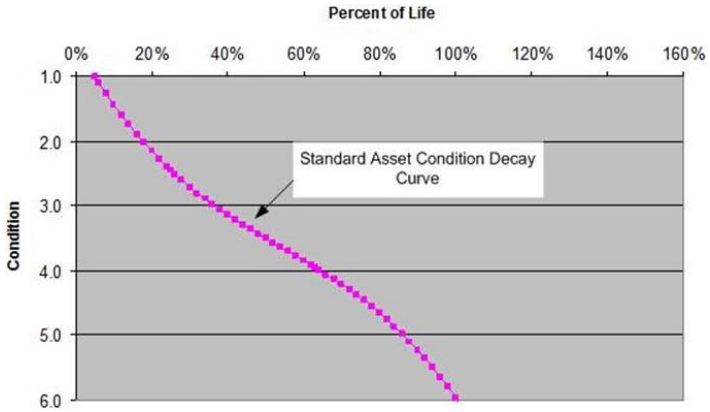


Figure 16 Sunwater's 'Standard' Decay Curve

The paper notes that Sunwater, presumably in FY10-FY11, intended to undertake a detailed analysis of historic condition and maintenance data to develop a family of standardised decay curves for different classes in recognition that different asset types decay in different ways (Section 4.1.3).

The paper proceeds to outline a planning approach based on failure distribution, and also demonstrates a risk-based approach for renewal planning of critical assets. In Section 4.3.4 the paper demonstrates an approach to revising the decay curve based on updated condition assessments. The methodology outlined is very similar to the summary of best practice presented in Section 4.2.1 above.

It appears, however, from our review of Sunwater's documents and subsequent interviews of asset management staff, that the intention to develop a family of decay curves was never acted on, and that Sunwater is still using the original curve to predict

[12] Asset Management Planning Methodology Paper, February 2011
[13] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

the lifecycle (and the end of life) of all its assets. The curve as presented is not a 'standard' in current use, and there is no indication that it was developed from analysis of asset failures, nor of the particular asset classes it was intended to represent.

Relating to the timing of works, in 2011 SKM noted that Sunwater's procedures are well defined for instances where an asset should be replaced before its standard run to failure asset life. However, SKM recommended that Sunwater further develop its processes for evaluating life extension.[14]

Sunwater defined asset lives and asset management strategies for Bulk water assets (and also for Irrigation assets) and notes a change of strategy for many classes of assets that generally provides for an increase in planned service life, in some cases into perpetuity.[15] These changes are likely to have a significant impact on the annuity, by delaying some renewal timing and eliminating other renewals entirely.

The documents provided do not provide any rationale for the life extension specified, and there has been no evidence provided to indicate that asset failure rates have been assessed and used to develop an informed assessment of asset service life. This point was raised in interview with Sunwater's asset management staff, who confirmed that there has been very little (if any) use of failure data in developing asset decay curves and predicting future renewal of assets.

Current best practice planning for asset renewal usually involves derivation or adoption of a family of Weibull curves, with a specific curve used to represent the failure risk of a specific asset type derived from actual failure records. There are a variety of tools in common use to support this approach, but there is no evidence that they are used by Sunwater. The life extensions provided for in the 'new' strategies included in the Overall Strategy documents imply that the assets concerned have not been failing as predicted by Sunwater's default decay curve, and since no justification has been provided for the increase in service life, we are inclined to assume that the increases provided are arbitrary.

Sunwater's 'standardised' approach to renewal of critical assets in advance of the standard curve (using a fixed multiplier) is also unlikely to be realistic, since it is being used as an indicator of risk of failure based on a curve that itself is suspect (Sunwater's methodology as documented suggests that it is intended to represent two standard deviations in advance of the median, but there is no evidence to support either the median or the standard deviation of the sample used, and therefore no evidence that either figure is applicable to the asset concerned).

Asset Management Systems and Processes

The key steps in Sunwater's non-routine maintenance planning cycle include:[16]

1. Development of draft non-routine project plans (including asset renewal projects) by asset planners

   Asset planners examine asset condition data including the results of recent inspections, risk data, asset refurbishment dates and replacement dates within SAP WMS to identify non-routine projects expected to be undertaken over the next five years.

2. Review of the draft non-routine projects plan by Regional Asset Planning Managers

3. Presentation of the draft non-routine projects plan to local staff and other key stakeholders

[14] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[15] Overall Strategy Common to all Bulk Water / Irrigation Schemes by Object Type.
[16] RfI A1: Approach to non-routine works and documentation, January 2019

4. Assessment of project complexity (to initiate specific workflows)
5. Data integrity checks
6. Transfer of data from WMS to the Sunwater Financial Model (SFM) to produce a draft budget
7. Presentation of the draft non-routine projects plan to customers and other stakeholders via NSPs
8. Final approval by the Chief Executive Officer and/or Board
9. A final data extract from WMS is loaded in to the SFM and final budgets are calculated
10. Creation of projects in the project governance module of WMS for delivery

Sunwater uses SAP PM to manage its asset register and to maintain its work management system and has recently introduced Viziya to optimise work schedules. Whole of life asset management planning is carried out using WMS, a SAP module (Figure 17). A GIS system is used to provide a spatial record.

These systems are primarily managed from Head Office but are accessible in the regions and are in daily use by regional staff.

Figure 17 Sunwater's Asset Management Systems

The processes and procedures used to identify, qualify and plan for asset renewal are well documented and comprehensive.[17] User manuals for each major asset class have detailed descriptions of inspection requirements, including the definitions used for condition rating to ensure a consistent approach and rating.[18]

[17] Asset Refurbishment Planning: Methodology for Condition Assessment of Assets, Sept 2012
[18] User Manual for Assessing Electrical / Mechanical / Civil / Headworks Assets

There are a range of templates used for project initiation, depending on potential project size,[19][20] and guidelines for defining non-routine project scope and developing a delivery management plan,[21] for risk assessment[22] and for defining and analysing renewal options as part of the business case development.[23]

Examples of all these documents have been reviewed.

Asset Condition Assessment

Condition assessment informs renewals planning over the entire planning period, however has a particularly significant role in the short-term in terms of validating expected works and identifying unplanned works.

In the prior review, the QCA's consultants identified issues relating to Sunwater's condition assessment methods and the quality of condition assessment data. In relation to Sunwater's condition assessment methods:

- SKM noted that Sunwater's use of asset age as an input into condition assessment may bias asset replacement to earlier than required. [24]
- Halcrow and SKM found that condition assessments are not always undertaken by Sunwater in accordance with procedural timelines, noting that the condition assessments on a number of assets were out of date. [25,26]
- SKM recommended that a condition assessment for major assets is performed within five years (as opposed to 10 years) of the development of a renewals submission. [27]
- SKM recommended that Sunwater should adopt condition assessment methods that extend beyond visual/operational based inspections, such as insulation breakdown tests and earth impedance tests for electrical/cable assets. [28]

In relation to the quality of condition assessment data, SKM noted that the completion of the condition reports and subsequent transfer of that data into Sunwater's WMS was of variable quality and on occasions ambiguous. It was recommended that Sunwater formalise the transfer of information from its condition assessments into its WMS, including data and data entry validation. [29]

Sunwater reported that condition assessments for the majority of bulk water assets were updated in 2015 (and report that 80% of assets have an assessment complete), consistent with prior consultant recommendations that asset condition inspections should be carried out within five years of the renewals submission. The condition assessment data improvements are expected to have improved the accuracy of the renewals planning.

However, we note that Sunwater continue to use non-invasive testing methods in condition monitoring. We also note that the document '*Asset Refurbishment Planning: Methodology for Condition Assessments of Assets*' indicates that age is still used as an assessment parameter.[30]

It appears that Sunwater has adopted a more formal process for the transfer of condition data into its WMS, with condition assessment procedures outlined in *'AM21*

[19] Non-Routine Work Initiation Justification (template)
[20] Business Case for Renewal Projects (3 templates)
[21] Non-Routine Project Scope and Delivery Management Plan
[22] Methodology for Risk Assessment of Infrastructure Assets
[23] Renewals Detailed Options Analysis
[24] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[25] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[26] Halcrow (2011). Sunwater - Biloela Water Supply Schemes ("Cluster 3") Review of Price Paths 2011 – 2016.
[27] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[28] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[29] SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.
[30] Asset Management Planning Methodology Paper, February 2011

P01 - Asset Condition User's Manual' and guidelines for transferring condition data into the WMS Planning outlined in *'User Manual for WMS with Condition and Risk Assessments'*.

4.2.3 Options Analysis

As discussed in Section 4.2.2, during the 2012 review the QCA's consultants found deficiencies relating to Sunwater's renewals planning process. This included the undertaking of options analysis in Sunwater's renewals planning process.

The QCA's recommended that Sunwater undertake options analysis according to cost materiality. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 18.

Table 18 Options Analysis for Material Renewals Expenditure

QCA Recommendation

The Authority recommended that Sunwater undertake:

- *High-level options analysis for all material renewals expenditures expected to occur over the Authority's recommended planning period, with a material renewal expenditure being defined as one which accounts for 10% or more in present value terms of total forecast renewals expenditure;*
- *Detailed options analysis (which also take into account trade-offs and impacts on operational expenditures) for all material renewals expenditures expected to occur within the subsequent five-year regulatory period, with a material renewal expenditure being defined as one which accounts for 10% or more in present value terms of total forecast renewals expenditure over that period.*
- *The costs of consultation provided by Sunwater ($445,000 p.a.) be incorporated in non-direct costs to cover consultation regarding both renewals and scheme specific operating costs (and that these then be allocated to irrigators and non-irrigators on the same basis as are other non-direct costs)*

Original Action Proposed / Taken by Sunwater

The following actions were taken by Sunwater:

- Incorporation of the options analysis cost allowance into the non-direct cost pool.
- Sunwater undertook options analyses for projects in FY14 and FY15 that met the 10% materiality threshold recommended by the QCA.
- Sunwater developed guidelines for options analyses and incorporated the new options analyses procedures for material projects into the renewals planning process.

Sunwater also expressed concern relating the efficiency of the recommended options analysis process. Sunwater contended that conducting options analysis for all material projects would result in inefficiencies, due to uncertainty relating to longer-term projects. Sunwater proposed (but did not yet implemented) an alternative approach to analyse material projects as close as practicable to the point in time that they impact annuity balances or the annuity price calculations. As such, Sunwater proposed an approach of:

- Completing detailed options analyses for projects within the current price path on a year-to-year basis for the following financial year
- Completing options analyses required for the next price review at the time of the review.

Sunwater's Current Position

After conducting the proposed options analysis approach, Sunwater reviewed its approach in 2018. Sunwater contended that conducting options analysis for all material projects would result in inefficiencies as:

- Many options studies were deemed of limited value, as outcomes were usually known beforehand based on engineering experience.
- Many options analyses took a week to prepare at a cost of $5k to $10k.
- Preparing options analyses up to 10–20 years in advance resulted in out-of-date solutions, due to technological change.
- Projects may be removed from the annuity period, incurring unnecessary work.

Following consultation with Irrigator Advisory Committee's (IACs), Sunwater decided to implement a new procedure for options assessments. Sunwater proposes to continue to prepare options analysis and supporting investigation where:

- There is no obvious solution
- The current maintenance strategy is changing
- Technology has changed significantly, or
- There is a high risk in the project execution.

For less complex (more routine) non-routine projects with fewer practical outcomes, Sunwater will use its engineering knowledge and experience to determine the optimum solution.

This approach is intended to take the emphasis off the value of the renewals project and focuses on solutions and risk.

Sunwater generally assumed like-for-like replacement in its renewals planning. Detailed planning was generally only undertaken by Sunwater within the coming 12-month period. Halcrow noted that water utilities in other states (NSW and Victoria) are typically required to complete detailed options analysis of renewals expenditures three to four years in advance.

Instead of undertaking options analysis for renewals which met the 10% materiality threshold recommended by the QCA, Sunwater has proposed to continue to undertake options analysis and supporting investigation where:

- There is no obvious solution
- The current maintenance strategy is changing
- Technology has changed significantly, or
- There is a high risk in the project execution.

The approach of conducting options analyses based on complexity, rather than cost materiality, does not align with the original QCA recommendation. Whilst reasonable in logic, the specific considerations guiding the implementation of options analysis are not measurable. For instance, there is no quantifiable measure to gauge whether a 'significant' change in technology has occurred. This approach has the potential to lead to inconsistent completion of options analysis, as compared to the recommended materiality threshold.

We therefore consider use of a materiality threshold (as recommended by the QCA) to be a more appropriate approach. Alternatively, at minimum, more detailed guidelines should be provided by Sunwater with the aim of ensuring greater consistency. For instance, Sunwater could consider a standardised assessment policy document where each qualification is clearly defined, and thresholds are more clearly specified.

Sunwater states that customers will be provided an opportunity to provide feedback on the selection of projects for options analysis. However, a formal process for incorporating customer feedback is in option the selection decisions has not been sighted. This is discussed in Section 4.4.1.

We note Sunwater's concern that '*preparing options analyses up to 10–20 years in advance resulted in out-of-date solutions, due to technological change… [and that] Projects may be removed from the annuity period*'. We consider this to be a reasonable concern for outer term years, however note that this issue does not preclude the requirement to conduct options analysis for the five-year regulatory period.

However, in relation to Sunwater's statement that the outcomes of options '*were deemed of limited value, as outcomes were usually known beforehand*', we consider that this may partially be due to the analysis approach taken. Based on sighted examples of options analyses and the findings of Sunwater's internal review, many options analyses appear to be of limited value due to the nature of the options considered, where options often are restricted to 'do nothing', 'replace' or 'refurbish'. The value of this process may be increased if more realistic, analytical options are considered, for instance giving consideration to alternative technological solutions or alternative timing.

We also note that justifications of the values / ratings used in options assessments have not been made available for review. For example, the approach to calculating the 0-5 values used in the multi-criteria options analysis (MCA) are not documented. It appears that a clearer (definitive) link could be established between the MCA inputs and the other assessment methodologies employed (such as a matrix relating the low, medium, high, extreme risk assessment rating to the 0-5 risk rating used in the MCA).

We recommend that Sunwater review the options selection process with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for and review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology.

4.2.4 Sunwater's Planning Period

The renewals annuity is calculated over a specified planning period with a view to smoothing the significant variation in capital expenditure that is typical for large infrastructure owners. A 30-year price path was adopted for the 2006-11 price path period. However, in its submission for the 2012-17 price path period Sunwater proposed a 20-year planning period in order to minimise uncertainties associated with estimating expenditures over longer periods, stating that there is a high degree of uncertainty as to the precise need for and timing of expenditure between 20-30 years.

In 2012, the QCA recommended that Sunwater undertake a 20-year planning period. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 19.

Table 19 Renewals Planning Period

QCA Recommendation *The Authority recommends that a 20-year planning period be adopted, as proposed by Sunwater.* *The Authority also recommends that the length of the planning period be revisited in subsequent price reviews (or as a result of a price trigger) should problems of intergenerational equity arise as a result of significant capital expenditure proposals.*
Original Action Proposed / Taken by Sunwater • Sunwater initially proposed a 20-year planning period.
Sunwater's Current Position • Sunwater has proposed that the annuity be extended to 30 years.

Halcrow noted that industry benchmarks, standards and practices in other jurisdictions suggest that a higher degree of forward planning for capital (including renewals) expenditure is generally undertaken. [31,] However, in the 2012 review the QCA accepted the proposed planning period of 20 years in preference to 30 years due to concerns that:

- Sunwater did not apply high-level options analysis to forecast renewals expenditure in the early out-years, let alone in the period beyond 20 years. This exacerbates the uncertainty of taking account of expenditures beyond 20 years.
- For many schemes, there was substantial expenditure planned for the 20-30 year period (which remains relatively uncertain) which made a material difference to the proposed annuities.

[31] Halcrow (2011). Sunwater - Biloela Water Supply Schemes ("Cluster 3") Review of Price Paths 2011 – 2016.

Concerns expressed about adopting a shorter period include increased volatility in between pricing periods, and intergenerational equity issues as a result of significant capital expenditure spikes (arising due to long-asset lives).

Sunwater has proposed that the annuity be extended to 30 years and stated that it has improved its approach to forecasting non-routine expenditure. We have identified similar issues to those identified in the 2012 review, including the accuracy of the long-term renewals planning approach, shortcomings relating to whole-of-life cost optimisation and the incorporation of options analysis into renewals planning, but consider that the purpose and value of the annuity approach is better achieved if the period of the annuity is similar to the service life of the assets included.

4.3 Cost Estimation

This section reviews Sunwater's cost estimation process in relation to long-term renewals and short-term non-routine works.

Sunwater states that the asset replacement costs listed in the SAP Works Management System (WMS) are the basis for long-term renewal costs.[32] Sunwater also states that cost estimates for non-routine works are informed by the review of similar completed tasks, experience and advice from project managers and technical staff.[33] These preliminary cost estimates are reviewed in detail when the scheduled project falls within the next five-year period, when a business case is required for the proposed investment. Halcrow and SKM noted that Sunwater's used 'like-for-like' replacement as the basis for calculating replacement costs. This methodology results in an overestimation of replacement costs for asset types where technological advancement has reduced costs. Modern equivalent asset value was proposed as an alternative calculation methodology for replacement value.

Sunwater reported that a revaluation of irrigation system assets was conducted in 2016. Sunwater report in the *'Irrigation Systems Asset Revaluation Project Final Report'* that assets replacement values were calculated as modern equivalent asset replacement values where possible.[34] However, we note that not all assets have been valued on this basis, and that no indication has been provided on the extent of those that were. Despite this, we expect the asset revaluation to have improved the accuracy of the renewals planning.

In 2011, SKM noted that compared to publicly available data, the escalation rates used to estimate renewal costs from the Bill of Materials appeared to be high. Sunwater has since undergone a revaluation process for both bulk water and irrigation system assets and undergoes an ongoing review of escalation rates applied year on year.

In 2011, ARUP stated that there may be potential for over-estimation of future renewals costs in some instances due to Sunwater's automated approach of identifying works and estimating costs, specifically as economies of scale could be achieved where multiple works are undertaken at the same site.

Sunwater continue to prepare detailed works forecasts on a 12-month basis. We have not seen evidence of renewals validation occurring outside of the 12-month period. We have also not sighted evidence of scheduling (or other) efficiencies being provided for outside of the 12-month period.

4.4 Consultation Processes

Sunwater publishes Network Service Plans (NSPs) annually for each scheme. In the 2012 review, the QCA made numerous recommendations relating to customer consultation on Sunwater's annual NSPs, relating to:

- Inclusion of the renewals options analysis in NSPs
- Variance reporting and re-forecasting of renewals in NSPs
- Customer consultation on the annual NSPs

[32] RfI A3 Cost Estimation Process.
[33] RfI A3 Cost Estimation Process.
[34] Irrigation Systems Asset Revaluation Project Final Report, 2016.

4.4.1 Inclusion of the Renewals Options Analysis in NSPs

In the 2012 review, the QCA recommended that Sunwater publish options analysis for material forward projects in NSPs. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 20.

Table 20 Inclusion of the Renewals Options Analysis

QCA Recommendation *The NSPs should be enhanced to present:* • *High level options analysis for all material renewals expenditures expected to occur over the Authority's recommended planning period;* • *Detailed options analysis for all material renewals expenditures expected to occur within the subsequent five-year regulatory period.*
Original Action Proposed / Taken by Sunwater • Sunwater presented a summary of the findings of each options analysis within the NSPs. Sunwater did not include the entire options analysis, due to concerns regarding commercial-in-confidence material. Customers could however receive copies of the options analysis from Sunwater on request.
Sunwater's Current Position • As discussed in relation to Recommendation 1.1, Sunwater has decided to implement a new procedure for options assessments.

As discussed in Section 4.2.3, the approach of conducting options analyses based on complexity, rather than cost, means that options are not considered for all material projects, and does not align with the original QCA recommendation to present detailed (high-level) options analysis for all material expenditures expected to occur within the five-year regulatory period (planning period).

As discussed at Section 4.4.3, Sunwater states that customers will be provided an opportunity to provide feedback on the selection of projects for options analysis. However, a formal process for incorporating customer feedback is in option the selection decisions has not been sighted.

Sunwater should ensure that all planned material projects are clearly identified in Network Service Plans, not just those where an options analysis is anticipated to be conducted using Sunwater's proposed approach.

4.4.2 Variance Reporting and Re-forecasting of Renewals in NSPs

In the 2012 review, the QCA recommended that Sunwater report on variances for material renewals in NSPs. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 21.

Table 21 Variance Reporting and Re-forecasting of Renewals

QCA Recommendation *The NSPs should be enhanced to present details of Sunwater's proposed renewals expenditure items and accounting for significant variances between previously forecast and actual material renewals expenditure items.*
Original Action Proposed / Taken by Sunwater • Sunwater has an NSP Reporting Tool to summarise detailed SAP renewals cost information into reports that are directly comparable with QCA efficiency targets.
Sunwater's Current Position • Sunwater continue to report on renewals cost variances to the QCA's five-year price path period in NSPs.

NSPs report key capital projects (along with budgeted costs) for the price path period.

Evidence of cost variances reported against QCA targets (at the overall level for the scheme) has been sighted in NSPs. In their current form however, NSPs do not provide clear comparison of current to prior forecasts on a project level, or justification of variances. As NSPs report key capital projects for

the price path period, Sunwater could consider reporting variances at this project level to provide a more in-depth insight.

4.4.3 Customer Consultation on the Annual NSPs

In the 2012 review, the QCA recommended that Sunwater consult with customers in NSPs and annually publish both NSPs and customer submissions. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 22.

Table 22 Customer Consultation on the Annual NSPs

QCA Recommendation *The Authority recommends that Sunwater's Statement of Corporate Intent (SCI) (and relevant legislation) be amended to require Sunwater to consult with customers in relation to, and publish annually on its website, updated NSPs commencing prior to 30 June 2014.* *Customers' submissions in response to the NSPs and annual updates should also be published on Sunwater's website alongside Sunwater's responses and related decisions.*
Original Action Proposed / Taken by Sunwater • Sunwater consulted with customers via the Irrigator Advisory Committees and the Sunwater website. • Analysis of customer NSP feedback led to adjustments to NSP, and responses to NSP Feedback posted on the Sunwater Website • Notification issued to all registered customers when NSPs are published via email and text message.
Sunwater's Current Position • Sunwater has continued the adopted approach of customer consultation.

The consultation approach taken by Sunwater via Irrigator Advisory Committees and the Sunwater website reflects the requirements of the QCA recommendation.

Sunwater annually publishes NSPs and has continued to consult with customers on NSPs via the Irrigator Advisory Committees and the Sunwater website. Sunwater's approach on customer consultation is considered appropriate.

The content of the NSPs is, however, insufficient to provide a good understanding of emerging issues in the scheme and do not, in our opinion, provide an adequate summary of the impact, consequences and therefore the remedial or corrective action proposed. It is currently not possible to understand the variability in operational costs from the NSPs, and we recommend that Sunwater improve in this area.

4.5 Procurement

A review of procurement policies and practices forms part of Sunwater's policies and procedures review. The review was primarily based on documents provided by Sunwater through the Request for Information process[35], namely:

- Procurement Policy; Document PU001 P1; Revision 8 dated September 2018
- Procurement Decision Matrix; Document PU01_63; Revision 3
- Procurement Compliance Review and Improvement Guideline; Document 1918742

We note that no follow-up interviews with Sunwater's procurement department were conducted to augment this desktop review.

Additionally, we also researched and reviewed the following documents:

- Partnering with Sunwater: A guide for contractors, consultants and suppliers[36]
- Sunwater's Code of Conduct[37]

[35] Reference: QCA Information Request A2 – Procurement policy and strategy
[36] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Partnering_with_Sunwater.pdf - accessed 30-06-2019

- Sunwater's Fraud and Corrupt Conduct Policy[38]
- Sunwater's Board Delegation of Authority Framework and Policy[39]
- Director's Code of Conduct[40]
- Risk Management Policy[41]
- AS 4120—1994, Australian Standard - Code of tendering

4.5.1 The Benchmarks

For reference, the following documents were relied on as benchmarks for this review:

- Queensland Government's Procurement Policy; dated June 2018, which is the State Government's overarching policy for the procurement of goods and services, including construction, intended to deliver excellence in procurement outcomes for Queenslanders
- The Commonwealth Procurement Rules (CPRs); dated April 2019, issued by the Finance Minister under section 105B(1) of the Public Governance, Performance and Accountability Act 2013 (as amended in August 2017). The CPRs are the core of the Commonwealth's procurement framework.
- The ASX Code of Conduct for Suppliers; dated August 2017

The Commonwealth and the State procurement frameworks can be considered to incorporate national and international best practices and ASX Code of Conduct for Suppliers is considered to be industry best practice for listed entities and have therefore been considered as benchmarks for this review.

4.5.2 The Procurement Review

The CPRs define Procurement as the process of acquiring goods and services. It begins when a need has been identified and a decision has been made on the procurement requirement. Procurement continues through the processes of risk assessment, seeking and evaluating alternative solutions, and the awarding and reporting of a contract.

Central to Sunwater's procurement framework is the Procurement Policy whose purpose is to provide guidance for procurement activities to support Sunwater's business objectives and its customer outcomes. The policy is stated to align with the Queensland Government's Procurement Policy dated June 2018, and has been reviewed in relation to this. While the header of the documents refers Revision 8, page 4 of the document refers to Revision 04. Such a discrepancy is inconsistent with industry document management principles.

Sunwater's Procurement Decision Matrix provides a guide to Sunwater staff when undertaking any purchasing activity. For major goods and services with total consolidated costs of >$250,000, the number of quotes required is not mentioned. Other than a requirement to ensure that any variation to the purchase does not exceed budget or contingency, it is also unclear how the variations are to be managed. The decision matrix also specifies that for Standing Offer Arrangements (SOAs) two written quotes are required if the value of service is >$20,000 and if a written proposal/methodology is required. Only one quote is required if there written proposal/methodology is not required. It is unclear who decides whether or not a written proposal/methodology is required for a particular project and what conditions need to be satisfied for making such a decision. In our view all services should require a written proposal/methodology, however small as the current arrangement has potential for willful or negligent misuse.

Sunwater's Procurement Compliance Review and Improvement Guideline facilitates the implementation of a three-tier approach to procurement compliance review and improvement

[37] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Sunwater_Code_of_Conduct.pdf - accessed 30-06-2019
[38] Source: www.Sunwater.com.au/wp-content/uploads/2019/01/Fraud_and_Corrupt_Conduct_Policy.pdf - accessed 30-06-2019
[39] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Board_Delegations_of_Authority_Framework_and_Policy.pdf - accessed 30-06-2019
[40] Source: https://www.Sunwater.com.au/wp-content/uploads/2019/02/BOD-POL-05-Directors-Code-of-Conduct-b9ba4ea131884d5698b03d84485c7996.pdf - accessed 30-06-2019
[41] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Risk_Management_Policy.pdf - accessed 30-06-2019

processes, which will ensure that all business areas within Sunwater comply with the procurement policies and procedures.

We present the findings of our review of Sunwater's Procurement Policy in Table 23

Table 23 Assessment of Sunwater's Procurement Policy

Principle Number	Topic	Alignment with Benchmarks
1	Value for Money	Broadly aligns with Value for Money principles of benchmarked frameworks. However, Sunwater's framework for determining value for money does not adequately consider the alignment of service providers with Principle 2.3[42] of Sunwater's procurement policy to do business with ethically, environmentally and socially responsible suppliers. Principles 1.5, 1.6 and 1.7[43] consider social responsibility; however, we recommend that more explicit consideration be given to the aforementioned Principle 2.3 within the framework for assessing value for money, particularly in relation to ethical and environmental responsibility.
2	Advance Service Delivery, Safety, Economic, Environmental and Social Objectives	Aligns with Queensland Government's objectives to support the long-term wellbeing of the community. During the fact-check process, Sunwater stated that majority of procurement spend is regionally performed, while this Principle states that low value and low business risk procurement will be delegated to geographical locations closest to where the actual work is to be performed. Defining the applicable thresholds will help streamline procurement and delivery.

[42] Reference: QCA Information Request A2_Attachment 1_Procurement Policy, Page 2.
[43] Reference: QCA Information Request A2_Attachment 1_Procurement Policy, Page 1.

Principle Number	Topic	Alignment with Benchmarks
3	Integrity, Probity and Accountability	Broad alignment with benchmarked frameworks other than specifically prohibiting bribery and facilitation payments. However, we note the following deficiencies: • The need for inclusion of specific requirements to comply with all relevant laws and regulations in relation to bribery, corruption and other prohibited practices within the Procurement Policy and the Code of Conduct because while the Procurement Policy states that Sunwater's Code of Conduct is to be observed in all procurement activities and which in turn refers to Sunwater's expectation for individuals to be familiar with the Whistle-blower Protection provisions and the Corrupt Conduct Policy and Guide, the requirement is not specifically mentioned in the Procurement Policy or the Code of Conduct. • The Procurement Policy is silent on assigning clear roles and responsibilities. The Procurement Decision Matrix provides some guidance on when the Corporate Procurement should get involved in procurement activities. We understand that Sunwater maintains an organisational financial delegations list, which is applied in conjunction with the Procurement Policy and Procurement Decision Matrix. While definition of Financial Delegate outside of Corporate Procurement may exist (AECOM did not request specific clarification on this subject); we suggest that for clarity, the terms used in a document be defined within the same document. It is also to be noted that, Sunwater's Board Delegation of Authority Framework and Policy sets out a framework to establish standards of accountability and responsibility when making decisions of both a financial and non-financial nature relevant to Sunwater and its wholly owned subsidiaries. The framework document notes that Sunwater has documented matters of financial and non-financial nature that are reserved to the Board and delegated to the Chairman, Directors, Board Committees, the CEO and Company Secretary in schedule 1. Schedule 1 is labelled as 'Commercial-in-Confidence' and we have therefore not been able to review the applicable DoA triggers.
4	Leaders in procurement practice	Sunwater is committed to ensure full, fair and reasonable opportunities for Queensland suppliers. However, the Policy does not seek to run open, fair and transparent procurement process but rather most appropriate – based on its interpretation of the task. Most of the benchmarked frameworks require a planned approach to procurement. To be a leader in procurement practice would also entail keeping the market informed of upcoming major investment in a planned and methodological way. As an example, such an approach is demonstrated by the Department of Transport and Main Roads via *'The Queensland Transport and Roads Investment Program'* that details the current transport and road infrastructure projects pipeline that the Queensland Government plans to deliver over the next few years. Supplier and industry forums are run to inform the market on a regular basis that helps suppliers to plan ahead. It is not clear to what extent Sunwater shares the major project or investment pipeline with suitable suppliers in advance such that the suppliers can suitably prepare and offer best possible value for money outcomes. This may be an opportunity for improvement. This Principle refers to timely and effective procurement which is in line with benchmarked frameworks to ensure that focus is on outcomes rather than process.

Principle Number	Topic	Alignment with Benchmarks
5	Governance, Compliance, Risk and Planning	We note the following opportunities for improvement: • In the Risk and Opportunity Matrix provided by Sunwater (approved by the Sunwater Board in August 2018), the Likelihood x Consequences matrix is 5 x 5 but in the Methodology for Risk Assessment of Infrastructure Assets dated October 2012 the matrix is 7 x 6 and they have different definitions of the likelihood and consequences scenarios. Due to the number of assessments undertaken using the previous matrix and current system limitations, asset data is still considered against the outdated matrix contained in the Methodology for Risk Assessment of Infrastructure Assets. Sunwater has noted that it is committed to addressing this issue as part of the Finance and Asset Management System project. Additionally, Sunwater's Risk Management Policy notes the roles and responsibilities of various employee designations; however, it does not provide the risk matrix which should have been included for consideration. • Sunwater's approach to day-to-day decision making is not very clear as we note large variations between initial budget and final delivered budget. The rationale for some decisions has not been properly explained or documented. This may be because, Sunwater does not refer to records management specifically in the Procurement Policy and the focus on records management is based on compliance with ICT Records Management Policy and Guide to ensure appropriate access, confidentiality and security of information and not on proper documentation management as part of change management. • Sunwater's procurement policy only requires that the Financial Delegate must approve the scope and total spend prior to commencement of any purchase process. It does not state what documentation is minimum in order to allow this approval. Sunwater's procurement process could benefit from close alignment with the structured documentation process. For example, most benchmarked frameworks also have a requirement to document and record the business need that led to the requirement for the procurement. It is also considered good practice to record the close out documentation related to the procurement.

The procurement information provided by Sunwater is very high level. We have not been provided with any audit results that might have been conducted and therefore from the provided information we are unable to determine if the following documents are active and implemented:

- Procurement Management Plan
- Procurement and Contracting Strategy
- Procurement Delegations
- Procurement Procedures
- Contracting Management Plan
- Contract Management Processes

Procurement Compliance Review and Improvement Guideline

Sunwater has a three-tiered approach to Procurement Compliance Review (PCR):

Tier one: Quarterly Routine PCR Reporting –prepared by Central Procurement Team (CPT) for all business areas and provided to respective Senior Managers to enable them to be proactive in self-managing any areas of improvement.

Tier two: Annual PCR Health Check –prepared by CPT and provided to Senior Managers. This is followed by meeting between Manager Procurement and Senior and respective General Managers to improve processes and compliance.

Tier three: Formal Audits – this activity is undertaken by Internal Audit and other independent third parties e.g. QAO findings, SAI Global etc. who may utilise the information and findings from Tiers one and two and incorporate into the audit program for review.

AECOM has not received and therefore not reviewed any audit results to confirm the level of compliance or incorporation of any improvement initiatives.

Conclusions

As outlined in detail in Section 4.8.4, we have observed opportunities for improvement in relation to:

- Quality control of issued documents
- The alignment of risk matrices
- Review of procurement limits
- Bribery and facilitation payment prohibition
- Sunwater's records management process

4.6 Project Management

A review of project management procedure and practices forms part of Sunwater's policies and procedures review. The review was primarily based on documents provided by Sunwater through the Request for Information process[44,45,46], namely:

- QCA Information Request A5 - Attachment 5 - Project Scope and Delivery Management Plan example
- Portfolio, Program & Project Management Framework (P3MF) presentation dated April 2019
- Sunwater's current project management framework consisting of a suite of documents
- Sunwater's proposed draft P3MF procedure, document number 2306640, Rev A

We note that no specific follow-up interviews with Sunwater's project managers were conducted to augment this desktop review.

Additionally, we also researched and reviewed the following Sunwater documents:

- Risk Management Policy[47]
- Partnering with Sunwater: A guide for contractors, consultants and suppliers[48]

4.6.1 The Benchmarks

- Project Management Institute. (2013) A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition provides guidelines for managing individual projects and defines project management related concepts. It also describes the project management life cycle and its related processes, as well as the project life cycle.

[44] Reference: QCA Information Request A5 - Approval process for renewals
[45] Reference: QCA Information Request A50 - P3MF project management framework
[46] Reference: QCA Information Request A57 - Project management framework (current and proposed new)
[47] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Risk_Management_Policy.pdf - accessed 30-06-2019
[48] Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Partnering_with_Sunwater.pdf - accessed 30-06-2019

- Guidance on project management Australian Standard AS ISO 21500:2016 provides guidance for project management and can be used by any type of organization, including public, private or community organizations, and for any type of project, irrespective of complexity, size or duration.
- The Queensland Government does not have a coherent project management framework applicable to all infrastructure types. The Preliminary and Detailed Business Case Frameworks published by Building Queensland notes that day-to-day process of managing the business cases be in accordance with the project owning agency's project management methodology[49]. However, a number of key frameworks practiced by Queensland Government agencies can be taken to be benchmarks for this review, such as:
  - The OnQ framework, the Project Management Framework of the Department of Transport and Main Roads, ensures that the outputs from each project will deliver outcomes that are consistent with departmental objectives and government policy. The OnQ project management framework promotes:
    - communication between and with project stakeholders
    - planning the total project life-cycle before committing resources
    - an understanding of the bigger picture and the project's part in it
    - developing solutions that maximise stakeholder satisfaction
    - identification and management of opportunities and risks
    - improved reliability in estimating costs and benefits.
  - The Queensland Government Enterprise Architecture (QGEA) policy seeks to ensure a structured, effective and consistent approach for portfolio, program and project management is adopted across the Queensland Government. Agencies must use project, program and portfolio management methodologies, endorsed by the Queensland Government Chief Information Office, for all ICT or ICT-enabled initiatives. These are based on Portfolio, Programme and Project Offices (P3O®) AXELOS[50].

4.6.2 Review of Sunwater's Project Management Practices

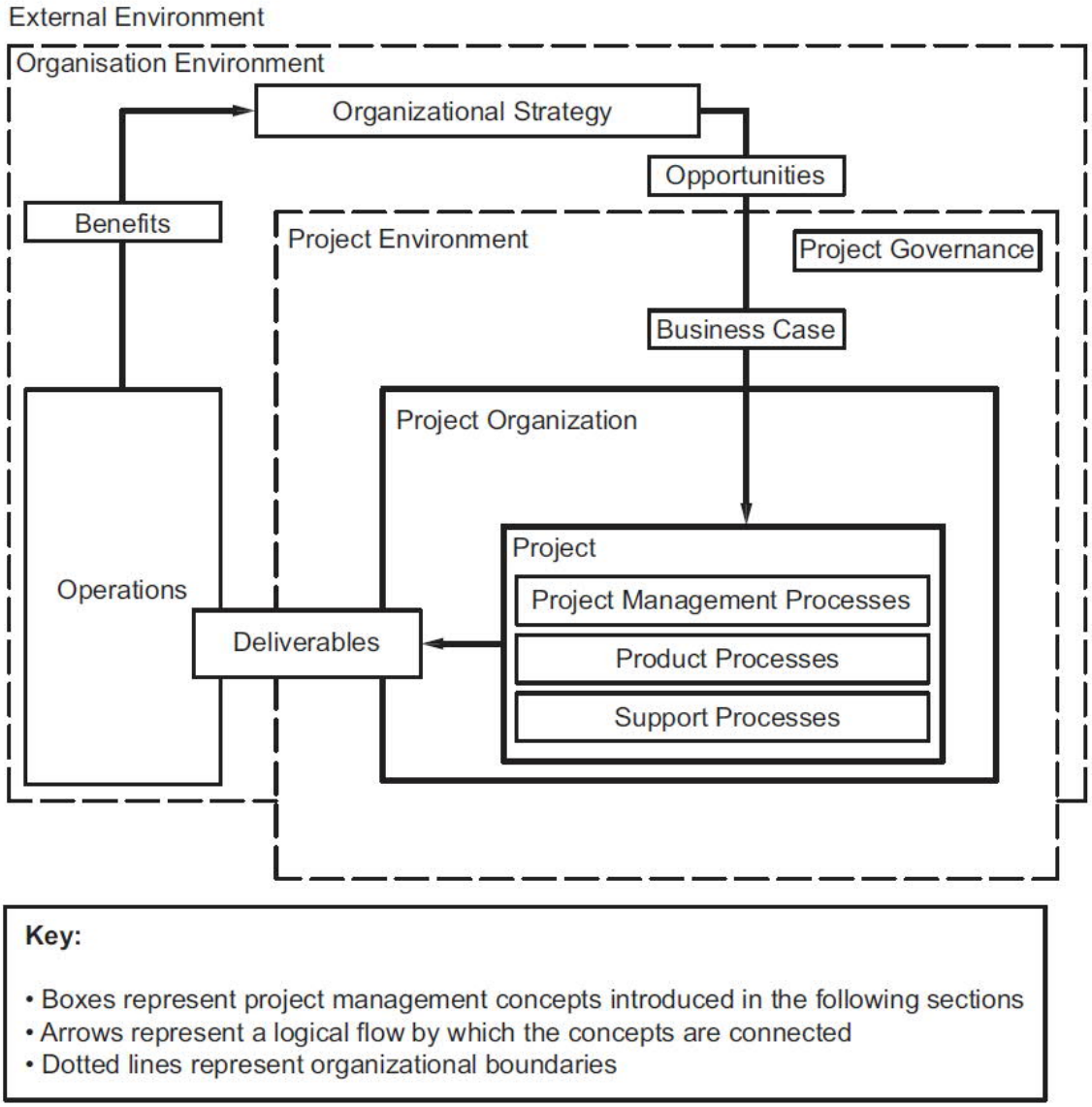
Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorized into five Process Groups. These five Process Groups are[51]:

- Initiating
- Planning
- Executing
- Monitoring and Controlling
- Closing

However, project management processes do not exist in an organisation on its own. Project management is intrinsically linked to the organisational strategy and operates in an organisational environment as shown in the overview of project management concepts and their relationships in Figure 18[52].

[49] Source: https://buildingqueensland.qld.gov.au/wp-content/uploads/2016/12/Detailed-Business-Case-2.1.pdf
[50] AXELOS is a joint venture company, created in 2013 by the Cabinet Office on behalf of Her Majesty's Government (HMG) in the United Kingdom and Capita plc, to manage, develop and grow the Global Best Practice portfolio.
[51] Project Management Institute. (2013) A Guide to the Project Management Body of Knowledge, Fifth Edition, Page 5
[52] Source: AS ISO 21500:2016 Section 3 Page 3

Figure 18 Overview of Project Management Concepts and their Relationships



Sunwater's current project management framework consists of a suite of documents which are mainly focused on major projects. While the current project management framework has serviced major projects well, there has not been a single framework document to support all the different types and sizes of projects within Sunwater. The following documents were provided for review[53]:

- Estimating template
- Project risk register
- Defects management checklist
- Project documentation handover form
- Major projects filing structure

[53] Reference: QCA Information Request A57 - Project management framework (current and proposed new)

- Project initial business case
- Program and project identification form
- Program steering group TOR
- Project dashboard report (Major Projects)
- Contract tracking register
- Project closure report
- Major Projects - Work breakdown structure (WBS) Procedure
- Project Variation Request form
- Major Projects Project Management Plan
- Lessons Learnt
- Project Steering Group meeting record
- Project Steering Group agenda
- Project deliverables acceptance certificate
- Project closure form.

Sunwater undertakes a wide variety of projects of various sizes and it seems that managing the projects in an ad-hoc manner would affect projects' efficiency and success.

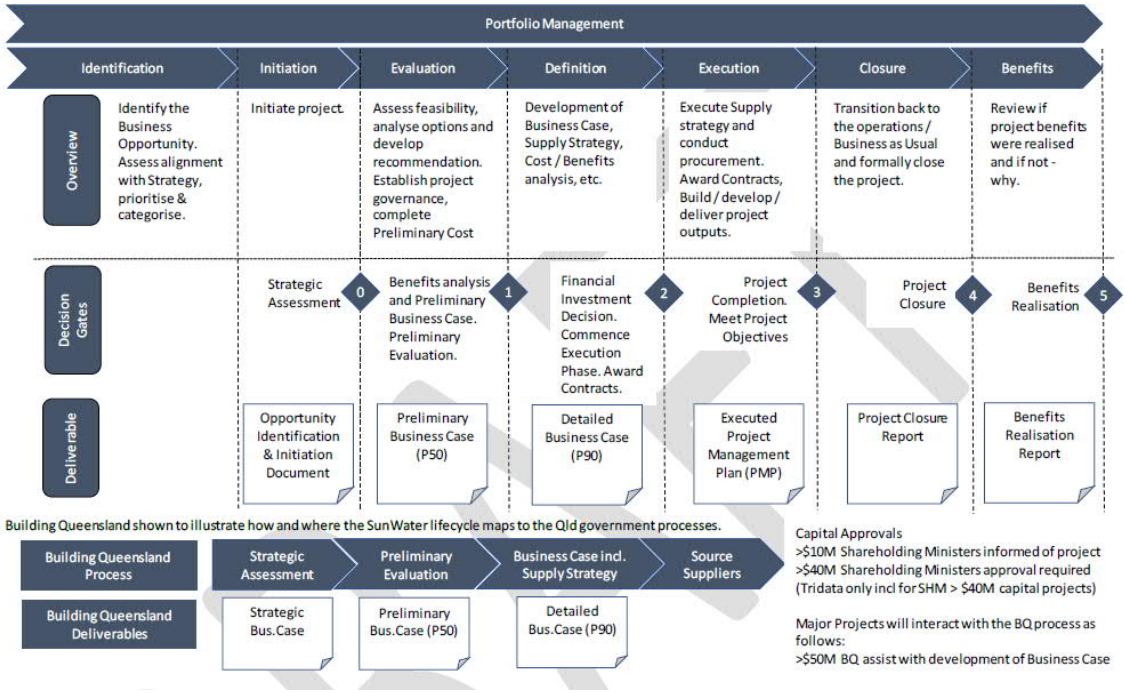
With this in mind, Sunwater is undertaking a review of the process to ensure all Sunwater requirements are met, and that they are captured in a single Portfolio, Program and Project Management Framework (P3MF) to ensure consistency and efficiency across the business. To support the framework, a software system is being evaluated and tested to provide greater visibility of the portfolio of work, as well as improve governance, controls and reporting. Implementation and roll out of the new system is scheduled for the third quarter 2019[54]. A draft framework was provided for review and it was stated that it was planned to have the framework finalised and ready for implementation by the end of June 2019. AECOM has not sought to confirm whether this has been achieved.

Figure 19 shows an overview of the Project Lifecycle and Governance Framework of the P3MF. Sunwater considers a Project Lifecycle to comprise of seven phases, namely, Identification, Initiation, Evaluation, Definition, Execution, Close out and Benefits. We note that the P3MF while claiming to align with *"A Guide to the Project Management Body of Knowledge, Fifth Edition"* does not give due stress on the Monitoring and Controlling process of the project lifecycle. Review of the sample of projects has brought to light a number of instances where the monitoring and control of the ongoing projects has been found lacking leading to unexplained variations and increase in costs.

We also note that the P3MF's process maps and tools seem to be overly complex and it is arguable whether they will deliver a good value for money unless they are clear and concise. We therefore agree with Sunwater's recognition that further work is required to standardise and simplify these tools. They further state that this work will be undertaken as part of the P3MF Phase #2 works and in alignment with the Policy Rationalisation Project[55].

[54] Reference: QCA Information Request A57 - Project management framework (current and proposed new)
[55] Draft Portfolio, Program and Project Management Framework (P3MF), Page 1

Figure 19 Sunwater's P3MF - Project Lifecycle and Governance Framework Overview



4.7 Cost Allocation

In the 2012 review, the QCA recommended that Sunwater improves its cost allocation for fixed renewals expenditure in bulk schemes and distribution systems. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 24.

Table 24 More Appropriate Allocation of Fixed Costs in Distribution Systems

QCA Recommendation *In relation to proposed cost allocation methodologies, the Authority recommends that:* • *Sunwater's proposed HUF methodology be used to allocate fixed renewals expenditure in bulk schemes between medium and high priority customers* • *Nominal WAEs (Water Access Entitlements) be used for the allocation of fixed distribution system costs between priority groups. Fixed distribution system charges should remain with customers when they convert between priority groups* • *Sunwater develop a more appropriate means of allocating fixed renewals costs in distribution systems and submit this for consideration by the Authority prior to 30 June 2014*
Original Action Proposed / Taken by Sunwater • Sunwater has implemented a consistent cost allocation methodology. • Sunwater initially proposed to identify options for alternative allocation methodologies for fixed costs in distribution systems. However, Sunwater suspended this item, stating that it was inappropriate to investigate alternative charging methodologies for fixed renewals costs in distribution systems until the LMA review was resolved.
Sunwater's Current Position • Sunwater maintains the previous position to suspend work on this item until the LMA review has concluded.

Sunwater has continued to use the Headworks Utilisation Factor (HUF) methodology to allocate fixed costs between medium and high priority customers and Water Access Entitlements (WAE) for the allocation of fixed distribution system costs between priority groups.

We note that Sunwater has implemented a consistent cost allocation methodology.

4.8 Conclusions

Key findings from our review of Sunwater's policies and procedures are discussed in relation to the relevant topic, and key recommendations provided.

4.8.1 Sunwater's renewal planning processes

In our review of Sunwater's renewal planning processes, we find that:

- Sunwater's asset management system (apart from the use of the decay curve to predict future renewal timing) appears to be satisfactory and consistent with good industry practice.
- Sunwater's asset management policies could be improved by including specific clauses around optimisation of asset management expenditure and with reference to the cost to its customers of service interruption, but in practice Sunwater has covered that issue in its various strategy documents and has demonstrated that it applies the principles in its planning.
- We would have expected to see service level expectations based on interruption duration as well as frequency. If interruption duration is not a significant concern for customers, then we accept the more limited definition of service levels but note that both measures (among others such as measures of quality) are usually needed for prudent, cost-effective asset management.
- Sunwater's renewal planning methodology as documented in the 2011 '*Asset Management Planning Methodology Paper*'[56] does not seem to have been adopted or implemented effectively.
- The reliance on an obscure equation to establish a decay curve for all assets is an issue, and we recommend that Sunwater deliver on its 2011 intention to develop a family of suitable curves for its asset types, preferably based on its own experience of failures. We would expect these to be Weibull curves.
- Development of suitable decay curves will enable more reliable assessment of failure risk, and therefore a more accurately defined point in the lifecycle of a critical asset that represents the maximum acceptable risk of failure. We note that this maximum acceptable risk should reflect customer expectations, and our review of these suggests that use of the second standard deviation is likely to represent a maximum risk that is far lower than required by Sunwater's customers. This is considered further in Section 7.0, which considers potential adjustments if Sunwater were to use industry best practice delay curve methodology.
- The recent increase in service life for selected assets appears arbitrary and implies that Sunwater is not experiencing the rates of failure provided for in its methodology document.
- We have not seen adequate evidence as to indicate that the relationship between renewals expenditure and operating activities are appropriately taken into account in the forecasting approach. We recommend that Sunwater give more rigorous (and documented) consideration to the trade-off between operating and capital works in the renewals planning process (namely in outer forecast years).
- The options analysis process for renewals projects has been found deficient in some respects:
    - The proposed approach for identifying renewal works which require options analysis does not align with the QCA's recommendation to undertake options analysis as based upon materiality
    - We have identified shortcomings of the reviewed options analysis in terms of the nature of the options considered and the formal assessment methodology employed

It should be noted that Sunwater actively reviews asset renewal proposals that fall within the pricing period and indicates that it will revise its renewal plan if asset condition does not require asset renewal. Most of the renewals planning issues identified relate to the rule-based approach used for renewals scheduled in the outer years, which are reflected in the annuity calculation.

[56] Asset Management Planning Methodology Paper, February 2011

4.8.2 Cost Estimation

We note that:

- Sunwater has taken actions to improve the accuracy of asset replacement costs, namely the revaluation of irrigation system assets conducted in 2016[57]
- Sunwater continues to prepare detailed works forecasts on a 12-month basis. We have not sighted evidence of scheduling (or other) efficiencies being provided for outside of the 12-month period.
- Sunwater states that a +/- 100% level of estimation accuracy is adopted for long term planning items for the purposes of enabling the generation of the annuity.[58] Sunwater does not appear to use any form of probability assessment for different scenarios as a means of deriving expected costs. The low level of estimation accuracy adopted appears due to the high-level nature and undefined scope of these planning items. Consultation Processes

4.8.3 Consultation Processes

In relation to the QCA's recommendations around NSP's, we have concluded that there are deficiencies in Sunwater's approach. Specifically:

- Renewals options analyses are not included in NSPs under Sunwater's proposed approach for identifying renewal works which require options analysis. There appears to be inadequate formal processes for incorporating customer feedback on this issue
- In their current form, NSPs do not provide clear comparison of current to prior forecasts on a project level, or adequate justification of variances

4.8.4 Procurement

From the review of procurement policy and procedures review we conclude that:

- There is inconsistent use of revision numbers and revision date in the various documents; for example, the Procurement Policy has two version numbers mentioned within the same document. It is recommended that Sunwater review all of its documents to ensure consistency of use of revision number for the respective documents. The Procurement Matrix has a revision number but no revision date.
- Some documents can benefit from provision of contact details, especially for the public policy documents; for example, Sunwater's Code of Conduct notes that any queries be referred to the General Manager People & Culture, however no contact details are provided.
- There is inconsistency in use of revision history and upcoming review information. Sunwater's Code of Conduct does not have a date of application and next planned review. Sunwater's Board Delegation of Authority Framework and Policy was due for next revision in December 2018 and is therefore out of date. Sunwater's guidelines on Partnering with Sunwater: A guide for contractors, consultants and suppliers is dated October 2015. The Procurement Decision matrix has no date of release or next review date. Director's Code of Conduct document refers to a review of the Policy by the Board every two years. The last review is stated to have been undertaken in December 2018 with the next review date noted to be in April 2019. It is possible that the while a review on April 2019 would have been planned for convenience e.g. in order to align with Board meetings, the review is now overdue nevertheless. The Procurement Compliance Review and Improvement Guideline; Document 1918742, notes that the guideline is to be reviewed 24 months from the date of approval. However, the document does not state the date of last approval, therefore it is not known whether it has been regularly reviewed and updated as necessary.
- The Risk Scoring Table in the Risk Matrix does not align with the Risk Scoring table in the Methodology for Risk Assessment of Infrastructure Assets as explained in Table 23.

[57] Irrigation Systems Asset Revaluation Project Final Report, 2016.
[58] RfI A3 Cost Estimation Process.

- The relatively high limit of $100,000 before corporate procurement or senior manager approval or involvement is necessary, has potential for misuse. Such a concern was also noted in the 2012 review of Sunwater's capex by the then consultant SKM.
- It is good practice to align records management closely with the procurement process steps. For example, the Commonwealth framework requires that documentation should provide accurate and concise information on:
  - the requirement for the procurement
  - the process that was followed
  - how value for money was considered and achieved
  - relevant approvals
  - relevant decisions and the basis of those decisions

  It has been noted during other parts of this review that business cases, decision rationale or close out documents were either not available or were never developed and hence not recorded.

4.8.5 Project Management

From a review of Sunwater's project management processes and framework, we note that:

- Sunwater's Portfolio, Project and Program Management (P3MF) process maps and tools appear to be overly complex
- Sunwater does not appear to have provided warranted attention to the Monitoring and Control process of the project lifecycle, which should be treated as a separate process group giving consideration to *"A Guide to the Project Management Body of Knowledge, Fifth Edition"* to which Sunwater's P3MF process is intended to align

Issues associated with project scope, cost and delivery which were observed during a review of sample projects support the finding that Sunwater's Monitoring and Control processes require improvement. From a review of a sample of projects, we make the following observations:

- The project reviews suggest that inconsistent project management appears to be a theme for Sunwater
- Sunwater reports that they have developed of a Workflow Root Cause Analysis Report to identify causes of program changes. We are aware that the root cause information is stored within the SAP Works Management System (WMS) but have not a sighted any formal analysis of this. It is unclear whether Sunwater uses this analysis to better inform their renewals planning.

Sunwater's new P3MF procedure does not specifically consider Monitoring and Controlling as a separate element of Project Lifecycle.

4.8.6 Key recommendations

4.8.6.1 Use of decay curves

In relation to renewal planning, we have concluded that Sunwater is using an obscure equation to project the timing of asset renewal for all its assets and has adopted a single approach (calculation) based on that to bring forward renewal of critical assets that may not reflect customer service expectations.

The practical implication is that the planning of asset renewal for the period subsequent to the next pricing period is likely to be conservative, and that renewal of a proportion of the assets as currently planned should be deferred. This conclusion applies particularly to renewal planning of critical assets, where three factors combine to bring forward renewal (the absence of a reliable decay curve, the period used to indicate renewal in advance of the curve, and the lack of a link to minimum acceptable service levels).

The best test of the value of the methodology used to predict asset failure is to demonstrate that the failure rate actually experienced is just within the risk tolerance acceptable to the customer. In the absence of data that demonstrates that Sunwater is achieving the maximum allowed failure rates, we

conclude that renewals included in the annuity should be deferred further than provided for in Sunwater's 2019 review but note that this conclusion should be revisited as soon as reliable predictions of failure can be made based on actual experience.

The extent to which asset renewal should be extended is unclear, since there is little information that can be used to support a recommendation. It may be simplest to adopt a simple deferral of all renewals currently planned, with the intention of reviewing the annuity when Sunwater has completed its assessment of failures and identified more suitable decay curves. This is considered further in Section 7.0, which considers potential adjustments if Sunwater were to use industry best practice delay curve methodology.

We strongly recommend that Sunwater undertake a comprehensive assessment of asset failures and use the outcomes to define the decay curves that will be used in projecting its future renewal program.

4.8.6.2 Incorporation of Options Analysis into Renewals Planning Process

In relation to the incorporation of options analysis in the renewals planning process, we recommend that Sunwater review the process of selecting projects for options analysis with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for and review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology.

4.8.6.3 Improvements to Procurement Policy and Procedures

Quality control of issued documents

- It is recommended that Sunwater review all of its documents to ensure consistency of use of revision number and also revision date.
- We recommend that contact details for General Manager People & Culture or at least the department of People & Culture be included in its next revision.
- We recommend that Sunwater undertake a comprehensive review of all its policies and procedures for currency and content and follow a standard quality management process of documenting releasing authority, last update and future review dates.

Alignment of Risk Matrices

We recommend that the Sunwater aligns its Risk Scoring Table within its various divisions along with consistent definitions of Likelihood and Consequences and its application.

Procurement limits

We recommend that all services should require a written proposal / methodology, the details of which can be aligned to the risk/complexity of the requested service. This will ensure that all such services will therefore require at least two quotes.

Bribery and facilitation payment prohibition

Include specific reference to bribery and facilitation payment prohibition in the Code of Conduct. Update the code and routinely provide ethics training to all employees (if not already done).

Improve records Management Process

Repurpose records management process in line with procurement process steps. Aligning record management processes with procurement processes will help to ensure that all documents are available and auditable.

4.8.7 Improve Project Management Processes

We recommend that Sunwater standardise and simplify its P3MF maps and tools, as stated to be undertaken as part of the P3MF Phase #2 works in alignment with the Policy Rationalisation Project[59].

Giving consideration to *"A Guide to the Project Management Body of Knowledge, Fifth Edition",* we recommend that Sunwater improve its P3MF process, with respect to giving the warranted attention to the Monitoring and Control process of the project lifecycle.

[59] Draft Portfolio, Program and Project Management Framework (P3MF), Page 1

5.0 Historical Renewals Assessments (FY12-FY18)

5.1 Project Reviews

A total of 21 historical projects from the period FY12-FY18 were reviewed under the project sample. The historical project sample consisted of four flood damage projects, twelve bulk water projects, and five distribution projects. The project review summaries are provided in Appendix A. They consist of a description of each project's background, the options assessment process, its implementation, and the findings on prudency and efficiency.

The assessment forms for the historical projects are included in Appendix E. The assessment forms include specific information on cost estimating, cost control, project governance and implementation.

5.2 Themes and Systemic Issues Arising from Project Reviews

We have identified three key themes and the associated systemic issues arising from review of the projects completed since FY12:

1. Poor Original Project Scoping and Cost Estimating

The project scoping process and associated cost estimates are often piecemeal and disorganised. Sometimes only the project development costs are included in the project cost estimate. Other times they are completely excluded. In some cases, different components of project are estimated separately. It is good practice to include all project scope for all phases of the project under one cover. Part of the reason for the piecemeal approach to project scoping and estimating may be Sunwater's annual budgeting and approval process. It appears that scopes and budgets are often only defined for a single year for the purposes of acquiring approval for particular year.

Project 13BIA48 for Flood Damage Repairs at Don Beattie PSTN is an example of this piecemeal approach to project scoping and estimating. The project ran from FY13 through to FY17 with the bulk of costs occurring in FY17 for construction. The documentation provided for review included nine different budgets of varying scope and cost. The final request for a budget increase prior to construction referenced an original budget of $498,369 but this figure was not documented in any of the nine budgets.

Another systemic issue identified with respect to project scoping and estimating is the frequent underestimating of the project costs. For the projects sampled, where original budgets were documented, the final actual expenditure was, on average, 267% greater than the original budgets proposed. Sunwater has a cost estimating guideline of +/-100% cost accuracy in the concept design phase. It is better practice and more commonplace to originally overestimate the project costs when the scope and preferred solutions are not yet known. Larger contingency amounts are applied, and the more expensive potential options should be accounted for. Then as the scope is further refined, the cost estimates would typically reduce.

Project 12SGA24 for Investigation and Works Requested at Moolabah Weir is an example of original underestimation of project costs. Sunwater initially estimated $207,732 for the works to repair damage to the weir from the 2011 floods. After the options assessment was completed, the estimate increased to $530,600 despite selecting the lowest cost option. The final actual costs were $639,046, which is 208% greater than the original budget. Sunwater has an incident identification level estimate accuracy requirement of +/-100%.

2. Benefits from Procurement Policy not Realised

A competitive tender process for goods and services increases the probability of obtaining the services under prevailing market conditions or better. The Sunwater Procurement Decision Matrix identifies the number of quotes that must be received depending on the cost of the purchase and the contract risk. Generally, for projects greater than $10,000, a minimum of two written quotes are required. Obtaining even more quotes increases the confidence that sufficient value is being obtained.

In the project sample, competitive procurement processes were generally undertaken, but in many cases insufficient offers were received. Early engagement with the offerors should be done to prepare them for the tender and gauge their interest prior to releasing the tender. Consideration to more appropriate bidding timelines may also encourage more quality offers. It appears common that offerors do not submit due to short timeframes. This requires improvements in Sunwater's early project planning such that Request for Offers can be released on time to prevent schedule rushes.

Project 07PIO05 for the Palmtree Creek Outlet Works is an example where a competitive procurement process was initiated but insufficient offers were received. The project documentation reported that an open tender process was undertaken on the Queensland Government eTender website for the supply and installation of a butterfly valve to serve as a guard valve on the Palmtree Creek outlet pipeline. Only one offer was received for $249,466 from [redacted]There are many suppliers of butterfly valves; therefore, it is not clear why only one offer was received. Had Sunwater engaged other suppliers earlier in the process, more offers may have been received.

Another systemic issue identified with respect to procurement is the apparent regular use and approval of procurement exemptions, especially where urgency is the documented reason. There appears to be gap in oversight and judgment of when procurement exemptions are made. In some of the projects reviewed, it was warranted. In other cases, the project occurred over multiple years, and the additional time needed for competitive tendering would have had a small overall impact on the project delivery schedule. In other cases, poor project management in the early stages of project appear to have caused urgency later in the project. For example, in the same project 07PIO05, procurement exemptions to allow a single quote was approved on two purchases, both based on urgency. A contract was awarded [redacted] for $59,710 for supply of a pepperpot valve and a contract of $39,770 was awarded to [redacted] for piping modifications. The exemptions were made in June 2012 and the works completed by September 2013. The Project Scoping documented was completed in February 2011, which described the scope of works including the pepperpot and piping modifications. The butterfly valve underwent a competitive tender in January 2012. It is unclear why the other scope items did not undergo a similar competitive tender process at the same time.

3. Poor Project Management and Supporting Documentation

The findings for themes related to project management and documentation comprise of:

- Inadequate or missing project scoping and project management documentation
- Inappropriate use of contingency amounts
- Poor contractor management and documentation of variations
- Inadequate or missing project closeout reports

The Project Scoping Document and Project Management Plans are essential to effective project management. Of the projects reviewed, the Project Scoping document, although a standard Sunwater project document, was often missing or even if completed, it was done poorly with many sections blank or too brief. The Project Scoping document summarizes critical information for effective project management including the proposed scope, the budget, the schedule, and project risks. Of all the projects reviewed, there was only one instance of a Project Management Plan being completed. This was for project 17BRI31. For another project (16MVA01), the Contractor had prepared a Project Management Plan, but Sunwater had not completed its own. The Project Management Plan, also a standard Sunwater document, is a more detailed plan for executing the project. Another systemic issue regarding the project management documentation is that even if a Project Scoping document was completed, it was never updated as the project progressed. Project management documents are intended to be live documents to adapt to the project as it progresses. Almost all projects have scope, budget, or schedule changes, but they are never documented in the project planning documentation.

Project 14MDA13 for the Mareeba-Dimbulah SCADA Upgrade is an example where an initial Project Scoping document was prepared on March 12, 2015 for the implementation phase of the project. It included detailed technical scope, a planning cost estimate for FY16, and key milestone

dates but the quality control, cash flow, and variations sections were blank. A memorandum later that month was prepared to propose changes to the scope, budget and schedule by integrating other related projects. The main Project Scoping Document was not updated to reflect these changes. There were three Prudency & Efficiency documents (one in August 2015 and two separate documents in June 2016) that describe changes to scope, budget, and schedule. It appears that the project is expected to be completed in FY19. Project management documentation was never kept current.

Another systemic issue identified in the project reviews was the inappropriate use of contingency amounts in project planning and implementation. Contingency is intended to cover cost estimate uncertainty and risk exposure. Sunwater has guidelines for the level of accuracy. At the time of project implementation, the project phase is supposedly at detailed design and the cost accuracy should be +/-30%; although, depending on the individual project it could be more accurate. Added to this is the risk contingency, which is a sum or the expected monetary value of project risks. The Sunwater Project Scoping document template has a section for a risk register and estimated cost, but it appears to rarely be used. The total contingency amount should be monitored throughout the project to check its adequacy.

Of the projects reviewed, it was noted that contingency amounts are inconsistent, rarely justified, and almost never linked to specific project risks. Instead, they appear to be used for allowing unexplained budget overruns. In many cases, project costs exceed the project budget including the allocated contingency, which reinforces that contingency amounts are not appropriately calculated.

In project 17BRI31 for the Giru Weir Outlet Works, the contractor identified a risk of wet weather and included a contingency amount for the cost of dewatering. The project documentation identifies that this was one of the reasons they were chosen as the preferred contractor. In this case, it appears that Sunwater has indirectly, through the contractor, included a calculated contingency amount for a defined risk. As the project progressed, the risk materialised, and dewatering was required. The contractor still filed a variation for dewatering, of which Sunwater accepted. The contingency amount was either inappropriately quantified, or its purpose was ignored.

The third systemic issue related to project management is related to poor contractor management and documentation of variations. In the same project 17BRI31, the contractor and material costs totalled to $633,378, which was higher than the combined total of $522,429 for contractor and material quotes specified in the procurement documents. There are no itemized variation reports or justifications for the additional materials or contractor costs. Project 07PIO05 is another example where the final contractor costs ($394,918) exceeded the contractor quotes ($348,956) and no itemized documentation of variations and their justifications were included.

The fourth systemic issue related to project management and documentation is associated with project close out reports. The reports are not always completed, and if they are, they are generally overly brief and do not add value. A project closeout report should provide a final summary and review of the initial and final scope, budget, and schedule. Reasoning for any changes should be documented such that an overview of the project challenges and successes can be made. This report is especially important considering project management documents tend not be updated throughout the project. The closeout report is an opportunity to establish lessons learned to guide continual improvement of project delivery.

In general, we note that overall documentation quality for the reviewed projects was frequently assessed as low. We believe that the range of documentation required for an assessment of capital projects is easy to define and should be available for in-house post project reviews carried out for audit purposes and to identify performance improvement opportunities (i.e., “lessons learned”). The documents should be standard practice for Sunwater. The consistency in preparing these documents is important to facilitate reviews such as this, whether done by third parties or done internally.

5.3 Conclusions and Recommendations

The review of the projects in the historical sample shows that projects are generally prudent and efficient with respect to scope and standard. The area of concern is with respect to cost efficiency.

The majority of projects tend to exceed the original budgets allocated. From the documentation provided, it appears that in most cases the final costs are justified, and the overruns are generally a result of poor original scoping and budgeting.

Adjustments have generally only been made where a budget overrun has occurred, and justifications are not provided or cannot be reasonably assumed. There are six projects out of the 21 with recommended adjustments. The projects with adjustments and their underlying issues are:

- 12SGA24 - A combination of unexplained budget overrun, poor scoping, and procurement exemptions
- 16BYR07 - Legal costs should be covered by the defendant (i.e. insurance company) or absorbed by Sunwater
- 07PIO05 - A combination of unexplained budget overrun and procurement exemptions
- 15CVA16 - A combination of unexplained budget overrun and procurement exemptions
- 13NMA04 - An unexplained budget overrun
- 17BRI31 - An unexplained budget overrun, specifically contractor and materials

The summary table of the historical project reviews is provided in Figure 20.

Project	Prudency Asessment	Efficiency Asessment			Claim ($ millions)			%	Review
		Scope	Standard	Cost	Claim	Adjust.	Accepted	Deductions	complete
12SGA24 - FD01 (2012) - Moolabah Weir - Dam Break & Upgrade Construction	✔	✔	✔	✘	$0.64	$0.04	$0.6	6.3%	Y
13LFZ07 - FD01 (2012) Eden Bann Repair and Desilt the Fishlock to make it operable after February 2012 flood	✔	✔	✔	✔	$0.49		$0.5		Y
12NMA08 - FD01 (2011) Tartrus Weir Flood Damage Repairs - Erosion & Protection Works	✔	✔	✔	✔	$0.23		$0.2		Y
16BYR07 - Boondooma Dam Spillway Repairs Project Insurance Claim	✘	✔	✔	✘	$0.59	$0.59	$0.0	100.0%	Y
Flood Damage Projects Total						**$0.6**	**$1.3**	**32.3%**	
16PRO03 - Investigate Spillway Chute Floor - Peter Faust Dam	✔	✔	✔	✔	$0.61		$0.6		Y
16MVA01 - Reinstate Down Stream Rock Protection - Mary River Barrage (Options/Design 2016)	✔	✔	✔	✔	$0.39		$0.4		Y
16CUW02 - Allan Tannock weir - Refurbish Outlet Works Gate	✔	✔	✔	✔	$0.03		$0.0		Y
14MAB05 - Coolmunda Dam: Refurbish Float Wells (Float Guides, Ropes, Tie Rod Ends)	✔	✔	✔	✔	$0.28		$0.3		Y
17BBR04 - Plug the River Conduit Inlet Tower Base Permanently - Eungella Dam	✔	✔	✔	✔	$0.41		$0.4		Y
07PIO05 - Replace Regulating Valve RV01 - Palmtree Creek Pipeline	✔	✔	✔	✘	$0.96	$0.09	$0.9	9.5%	Y
15PIO06 - Teemburra - Replace Control System including SCADA for Teemburra Dam, Palmtree Ck & Tannalo Valves - Teemburra Dam	✔	✔	✔	✔	$0.47		$0.5		Y
15CVA16 - Callide Flood Review	✔	✔	✔	✘	$1.55	$0.14	$1.4	8.8%	Y
15DAW01 - Upgrade PLC and SCADA System - MOSS Pump Station (Drawings/Spec/Cost Estimate 2015, Supply/Install/Commission 2016)	✔	✔	✔	✔	$0.26		$0.3		Y
12LFZ12 - Replace Control Equipment - Eden Bann Fishway (Scope/Options/Design 2014, Procure/Install/Commission 2015)	✔	✔	✔	✔	$0.14		$0.1		Y
13NMA04 - Spillway Seepage Investigations - Fairbairn Dam	✔	✔	✔	✘	$0.73	$0.07	$0.7	10.2%	Y
12MDA57 - Replace lighting system at the Tinaroo Falls Dam Gallery	✔	✔	✔	✔	$0.48		$0.5		Y
Bulk Water and Irrigation Scheme Projects Total						**$0.3**	**$6.0**	**4.8%**	
13BIA48 - FD01 (2013) Flood Damage Repairs - Don Beattie PSTN	✔	✔	✔	✔	$1.27		$1.3		Y
11ETO06 - Replace Switchboards and Control Equipment - Brightley Pstn 1 & 2	✔	✔	✔	✔	$0.97		$1.0		Y
14MDA13 - Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2	✔	✔	✔	✔	$0.88		$0.9		Y
17BRI31 - Install STG II Functional Outlet Works - Giru Weir	✔	✔	✔	✘	$0.77	$0.14	$0.6	18.9%	Y
14MDA33 - Study Copper Sulphate Research Project - West Barron Main Channel	✔	✔	✔	✔	$0.44		$0.4		Y
Distribution Scheme Projects Total						**$0.1**	**$4.2**	**3.4%**	
All Projects Reviewed (excluding Flood Damage Projects)						**$0.4**	**$10.2**	**4.2%**	
All Projects Reviewed						**$1.1**	**$11.5**	**8.6%**	

Figure 20 Summary of Historical Projects Review

The purpose of the project sample review is to identify systemic issues that may have impacted the prudent and efficient delivery of projects. The systemic issues have highlighted opportunities for Sunwater to improve in areas of project scoping, cost estimation, procurement, project management, and documentation. It is difficult to quantify a specific adjustment that would result from improvements in each of these areas. The dataset is small and statistically it would not be appropriate to conclude individual adjustments per systemic issue.

An overall indicative adjustment for the combined effect of the systemic issues could be made. Figure 20 shows the total adjustments across all projects. For all projects reviewed, an 8.6% reduction was concluded. This number includes an adjustment of $630,000 for flood damage projects, which due to their innate urgency are not representative of the majority of Sunwater projects. The Boondooma Legal Insurance adjustment is clearly a project-specific adjustment as opposed to a systemic based adjustment.

The total adjustment when excluding the flood damage projects is 4.2%. This is based on 4 projects out of the sample of 17 projects. This number is more representative of an adjustment related to the systemic issues and could potentially be extrapolated to the full historical projects portfolio.

6.0 Transitional and Forward Renewals Assessments (FY19-FY53)

6.1 Project Reviews

A total of 65 transitional and forward renewal projects from the period FY18-FY53 were reviewed under the project sample. The project sample consisted of 46 bulk water projects and 19 distribution projects. The projects were a combination of once-off projects and rolling programs. The majority of projects had costs in each of the review periods – transitional (FY19-FY20), price path period (FY21-FY24), and beyond price path period (FY25-FY53). For this reason, the project reviews have not been separated by period.

The project review summaries are provided in Appendix B. They consist of a description of each project's background, the options assessment process, its implementation, and the findings on prudency and efficiency.

The assessment forms for the transitional and forward renewal projects are included in Appendix F. The assessment forms include specific information on cost estimating, cost control, project governance and implementation.

6.2 Themes and Systemic Issues Arising from Project Reviews

We have identified three key themes and the associated systemic issues arising from review of the projects proposed in the transitional and forward periods:

1. Timing of Replacement and Refurbishment

Sunwater has three planning tools that guide the scheduling of asset refurbishment and replacements. These are the:

- *Overall Strategy Common to all Irrigation Schemes by Object Type*
- *Overall Strategy Common to all Bulk Water Schemes by Object Type*
- *Whole of Life Maintenance Strategy and Object Codes*

The *Overall Strategy Common to all Irrigation Schemes by Object Type* is a strategy document that outlines specific asset strategies for a variety, but not all, of asset groups (also called object type) in the irrigation schemes. It is proposed to apply these asset strategies to the 30-year program to better reflect a lower whole of life cost approach and avoid unnecessarily brining major replacement items into the price path period, while still meeting condition and risk standards.

The *Overall Strategy Common to all Bulk Water Schemes by Object Type* is a similar strategy document but applies to asset groups in the bulk water schemes. It, also, only applies to a 30-year planning period.

The *Whole of Life Maintenance Strategy and Object Codes* provides a comprehensive listing of asset lives and refurbishment intervals for asset groups and sub-components or types of equipment within the asset group. Sunwater has adopted the standard life for each equipment type based on the available maintenance histories, literature review of public domain information and the collective engineering and technical experience of staff and consultants. Each equipment has a standard low risk life. This is defined as the mean time to failure for the equipment installed and operated in typical (or average) conditions. If the asset is deemed medium or high risk, the asset life is reduced to mitigate a run-to-failure scenario. So that assets remain in a serviceable condition throughout the adopted asset life, many undergo periodic maintenance or refurbishment. Sunwater has adopted refurbishment frequencies based on the available maintenance histories and the collective engineering and technical experience of staff and consultants. Some object types are "run to failure" and do not have a refurbishment frequency, while others are "in perpetuity" and are therefore not planned to be replaced.

Sunwater's intention is to apply the replacement and refurbishment intervals specified in the two asset strategy documents where the equipment falls into a defined asset group and the project is within the 30-year planning period. All other types of equipment or projects outside this 30-year period revert to the whole of life maintenance strategy.

Through review of the transitional and forward projects in the sample, we found that the application of the recommended replacement and refurbishment intervals was inconsistent. It often did not match the relevant asset strategy document, and sometimes did not match any of the three documents. For example, Project 0000042519 Cherry Creek Siphon Pipe Replacement involved the replacement of reinforced concrete sections of pipe in FY49 at an age of 92. This asset life does not match any of the planning documents. The applicable asset strategy is to adopt a 100-year life subject to regular condition and risk assessments. The most recent high-level condition assessment of the pipeline, in 2002, suggested it is level 2, which is equivalent to good condition. Based on this and the Sunwater decay curve, the replacement should be postponed beyond FY53.

Another systemic issue with respect to refurbishment and replacement timings is the coordination of planned refurbishments with future replacements. It appears that Sunwater has scheduled refurbishments in regular intervals based on the asset start-up date, but it does not consider the timing of proposed future replacements. In some cases, a proposed refurbishment was planned in the same or adjoining year of the replacement. For example, project 0000069873 19BBR09 Gattonvale PSTN Pump 1 Refurbishment was proposed in 6-year intervals starting in FY19. Firstly, the pump start-up year was 2005, therefore the refurbishment schedule has been offset by two years. Secondly, the pump is due for replacement in FY35 and the scheduled refurbishment was not omitted for that year (i.e., it was still scheduled in FY37, noting the two-year offset).

2. Transparency and Consistency of Cost Estimation

While for most of the projects in the transitional years i.e. FY19 and FY20; sufficient information in relation to basis of cost estimate was available; however, for most of the projects in the price path and beyond price path periods no basis of cost estimate documentation specific to the projects reviewed was sighted. Sunwater states that the asset replacement costs listed in its WMS are the basis for long-term renewal costs.[60] Based on information in the asset register, asset revaluations were carried out by Sunwater, and its consultants, in 2008, 2015, 2016, 2017, 2018. The Sunwater capital expenditure submission was given in nominal dollar amounts; therefore, the exact comparison to the asset register replacement values is not possible since it is not known what inflation and escalation factors were applied. That said, by applying CPI (for Brisbane), to convert both figures into $FY19, the values should be close enough to confirm a correlation. For many projects in the sample, a correlation could not be made. For example, project 00000075493 21ETO10 Oakenden Main Channel Flow Meter Replacement included a capital expenditure in FY21 for $166,400 in nominal dollars. In $FY19, this is $159,360. The asset register replacement value was $2,366 valued in FY15. In $FY19, this is $2,530. There is a clear and significant discrepancy for this project. This is consistent for most flow meters. Replacements for other types of assets are generally closer, but rarely match.

The refurbishment costs cannot be compared to replacement cost data contained in the asset register. Sunwater states that cost estimates for non-routine works are informed by the review of similar completed tasks, experience and advice from project managers and technical staff.[61] However, inadequate supporting information was provided to explain how refurbishment costs were established for the reviewed projects. For example, for project 0000069873 19BBR09 Gattonvale PSTN Pump 1 Refurbishment, we note that an adjustment was recommended to the proposed expenditure because the cost was four times the pump replacement value on average.

Lastly, another observation with respect to the proposed capital expenditures in a rolling program was variations in year to year estimates. It is not clear how Sunwater estimated the replacement and refurbishment costs, but presumably the same methodology would be applied consistently for each year. For example, project 0000076329 24BIA20 Isis System Concrete Lined Channel

[60] RfI A3 Cost Estimation Process.
[61] RfI A3 Cost Estimation Process.

Refurbishment proposed a 5-year cycle of refurbishments. Converted to $FY19, the cost of each refurbishment ranged from $391,000 to $468,000. There was no clear trajectory, so it is unlikely related to any material cost escalation. The reasons for fluctuations could not be determined.

3. Separation of Project Development and Implementation Phase Costs

It appears that Sunwater often separates project funding between the project development and implementation phases. This practice makes it difficult to analyse the full cost of a project. The asset replacement values in the asset register are calculated including allowances for project development costs. The August 2018 *Irrigation System Asset Revaluation Project* document states that Ownership Costs ranging from 47% to 97% of the direct costs, depending on location, are applied to establish the total replacement value. Other than the location allowance, the ownership cost is comprised of allowances for scoping, design, and indirects among other implementation phase costs such as project management, safety, procurement, legal, and travel.

For example, project 0000074061 19BDK01 Clare Weir Flap Gate Hydraulic Cylinder Refurbishment (Stage 3) is planned for FY20 for $247,000 in $FY19. This project has not only excluded the planning work that went into defining the project scope (i.e., presumably Stage 1 & 2), but it appears to also have split out different parts of the proposed rolling program into separate projects. The proposed program is for the refurbishment of 150 hydraulic cylinders at a cost upward of $2M. While the project has uncertainty regarding what the FY20 scope encompasses, it is evident that it does not capture the full project scope for the project development phase or the full refurbishment program.

6.3 Conclusions and Recommendations

The review of the projects in the transitional and forward renewals sample generally show inconsistent and unclear application of project timing, frequency, scope and costs. Of the 65 projects reviewed, 17 have not been considered prudent. This is primarily due proposed timing inconsistent with the asset strategy or projects that require delay due to their assessed condition and calculated remaining life.

For project efficiency, of the 65 projects reviewed, six projects were identified to have inefficiencies in scope, two in standard, and 12 in cost.

Adjustments have generally only been made where the proposed capital expenditure is unreasonably greater than the asset register replacement value (in the case of a replacement) or a documented budget/cost estimate. Timing of renewals has also been adjusted for some projects. For these cases, any adjustment is reflected in the recommendation from the annuities assessment to avoid double counting an adjustment.

The projects recommended for adjustment, and their reasoning, are:

- 0000057410 - Adjusted to match cost estimate provided
- 0000065103 - Adjusted to match replacement cost estimates provided for various flow meters
- 0000069873 - Refurbishment reduced to less than replacement cost from asset register and timing of refurbishment also corrected
- 0000073006 - Rejected due to change in engineering standards that change project driver
- 0000075186 - Adjusted based on project budget overrun
- 0000076177 and 0000076265- Adjusted to match cost estimate provided
- 0000076554 – Rejected due lack of evidence showing project need
- 0000076329 – Adjusted to correct an apparent error in scope and cost of replacement
- 0000014241 – Adjusted to reflect replacement cost from asset register
- 0000075493 – Adjusted to reflect replacement cost provided for flow meter rolling programs
- 0000008682 – Adjusted to account for refurbishments that would occur in the year the asset is replaced

- 0000042159, 0000072774, 0000030670, 0000045622 - Replacement delayed beyond FY53 to reflect asset strategy
- 0000015276,0000015210, 0000030689, 0000025738, 0000015726, 0000015177, 0000075990, 0000055946, 0000042132 – Timings adjusted to reflect delay recommended by annuities assessment, but does not have any cost impacts

The summary of project reviews has been divided into three tables for the various review periods (transitional years, price path period, and beyond price path period), presented in Figure 21, Figure 22, and Figure 23 respectively. We note that some projects had expenditure occurring in more than one of the three review periods, and the findings presented in this section should be considered accordingly.

Project	Prudency Assesment	Efficiency Asessment			Total, FY19-20 $FY2019 '000s				Deduction Type
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	
0000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review - Burdekin Falls Dam	✔	✔	✔	✔	$143		$143		
0000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	✔	✔	✔	✔	$122		$122		
0000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	✔	✔	✔	✔	$337		$337		
0000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	✔	✔	✔	✔	$329		$329		
0000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	✔	✔	✔	✔	$349		$349		
0000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec,See notes.)	✔	✔	✔	✔	$142		$142		
0000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy ($41,595 / yr) (P2)	✔	✔	✔	✔	$78		$78		
0000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✔	✔	✔	✔	$110		$110		
0000058091 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	✔	✔	✔	✔	$231		$231		
0000064409 - KROOMBIT DAM - 20 Dam Safety Review (to be done by 1st June 2020)	✔	✔	✔	✔	$254		$254		
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✔	✔	✔	✔	$82		$82		
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	✔	✔	✔	✘	$85	$33	$52	39%	Project Specific
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✔	✔	✔	✔	$124		$124		
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✔	✔	✔	✔	$64		$64		
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 ($24,052/yr) (P2)	✔	✔	✔	✔	$46		$46		
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	✔	✔	✔	✔	$23		$23		
0000067246 - BEN ANDERSON BARRAGE - Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	✔	✔	✔	✔	$300		$300		
0000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattonvale PSTN	✘	✔	✔	✘	$70	$70		100%	Systemic (High Cost Estimate)
0000070052 - EUNGELLA DAM - 19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)	✔	✔	✔	✔	$229		$229		
0000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	✔	✔	✔	✔	$247		$247		
0000075186 - EUNGELLA DAM - 17BBR04 Eungella Dam - Permanently Isolate River Conduit Intake Tower Base - Refer Opt Sty #2039445 & Cst Est #2301154	✔	✔	✔	✘	$673	$227	$445	34%	Systemic (Budget Overrun)
0000075187 - GATTONVALE OFF STREAM STORAGE - 17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Conditon Based (Rfr DS Insp Rpt #2288631)	✔	✔	✔	✔	$586		$586		
0000075973 - BURDEKIN FALLS DAM - 18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)	✔	✔	✔	✔	$124		$124		
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✔	✔	✔	✔	$103		$103		
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✔	✔	✔	✔	$113		$113		
0000076177 - BEN ANDERSON BARRAGE - Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	✔	✔	✔	✘	$386	$133	$253	34%	Systemic (Budget Overrun)
0000076200 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1	✔	✔	✔	✔	$940		$940		
0000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review -Burdekin Falls Dam (2018-2020 Project)	✔	✔	✔	✘	$146	$25	$120	17%	Systemic (High Cost Estimate)
0000076381 - SYSTEM - 16BAL12 Beardmore Dam - Thurragi Channel Repair	✔	✘	✔	✔	$1,338		$1,338		
0000076554 - CHINCHILLA WEIR - Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir	✘	✘	✘	✘	$75	$75		100%	Project Specific
0000076580 - FAIRBAIRN DAM - Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)	✔	✔	✔	✔	$280		$280		
0000076609 - MARY BARRAGE - 16MVA01 Reinstating D/S Rock protection - Mary Barrage	✔	✔	✔	✔	$397		$397		
0000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	✔	✔	✔	✔	$128		$128		
0000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - '[redacted]Options Study Review Report' Doc Ref #2242568 Option #4	✘	✔	✔	✔	$180		$180		Driven by Annuities Review
0000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	✘	✔	✔	✔	$46		$46		Systemic (Timing)
0000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	✔	✔	✔	✔	$42		$42		
All Projects Reviewed					**$8,921**	**$564**	**$8,357**	**6.3%**	
Project Specific/ One-Off Adjustments					**$160**	**$108**	**$52**	**1.2%**	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						**$456**		**5.1%**	

Figure 21 Summary of Project Reviews in the Transitional Years

The purpose of the project sample review is to identify systemic issues that may have impacted the prudent and efficient delivery of projects. For the transitional and forward renewal projects, as there

was no project-specific information provided such as scope of works, bill of materials, or cost estimates, the prudency and efficiency assessment was predominantly conducted based on adherence to the policies, guidelines, and processes used by Sunwater. For this reason, the total adjustments are not specific to project type or asset type. An attempt to group adjustments by project or asset type is not recommended. Instead, an overall adjustment to account for systemic issues should be derived from the full project sample. Whilst there are some common themes identified between the project reviews and the review of Sunwater's policies and procedures (such as poor project management), the suggested adjustments are combination of one or more of the deficiencies in Sunwater's policies and procedures outlined in Section 4.0.The calculation of the percentage reduction for the systemic issues is based on the value of total adjustments recommended divided by the total value of all projects in the stated period. Any project-specific adjustments have been identified and excluded from the systemic issues adjustment but are reported separately.

The total recommended adjustment for systemic issues identified in the transitional years is 5.1% and is based on adjustments to five projects. Additionally, the total project-specific adjustment is $108,000 and reflects adjustments to two projects.

Project	Prudency	Efficiency Assessment			Total, FY21-24 $FY2019 '000s				Deduction
	Asessment	Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	Type
0000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes $5k for elec. insp.), see notes.	✔	✔	✔	✔	$110		$110		
0000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020	✔	✔	✔	✔	$76		$76		
0000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec,See notes.)	✔	✔	✔	✔	$158		$158		
0000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy ($41,595 / yr) (P2)	✔	✔	✔	✔	$153		$153		
0000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) -Large cost associated with draining dissipator	✔	✔	✔	✔	$130		$130		
0000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✔	✔	✔	✔	$118		$118		
0000048336 - PETER FAUST DAM - Study: 20yr Dam Safety Rview (by 1 Dec 2023) incl. tasks mentioned in notes	✔	✔	✔	✔	$350		$350		
0000048820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	✔	✔	✔	✔	$42		$42		
0000057410 - ALLAN TANNOCK WEIR - Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)	✔	✔	✔	✘	$51	$1	$49	3%	Project Specific
0000064557 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	✔	✔	✔	✔	$133		$133		
0000064960 - LESLIE DAM - Replace Crane Control Equipment	✔	✔	✔	✔	$154		$154		
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✔	✔	✔	✔	$161		$161		
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	✔	✔	✔	✘	$327	$119	$208	36%	Project Specific
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✔	✔	✔	✔	$244		$244		
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✔	✔	✔	✔	$125		$125		
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 ($24,052/yr) (P2)	✔	✔	✔	✔	$90		$90		
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	✔	✔	✔	✔	$45		$45		
0000072774 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	✘	✘	✘	✘	$350	$350		100%	Captured by Annuities
0000073006 - KINCHANT DAM - Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake	✘	✔	✔	✔	$285	$285	$0	100%	Project Specific
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✔	✔	✔	✔	$201		$201		
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✔	✔	✔	✔	$222		$222		
0000076201 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 2	✔	✔	✔	✔	$1,862		$1,862		
0000076370 - FAIRBAIRN DAM - Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.	✔	✔	✔	✔	$487		$487		
0000076581 - BJELKE-PETERSEN DAM - Study: Bathymetric survey of BjelkePetersen Dam (ELT directive - see notes)	✔	✔	✔	✔	$47		$47		
0000075990 - OWANYILLA PUMP STATION - 24LOW03 Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)	✘	✔	✔	✔	$441	$441		100%	Driven by Annuities Review
0000075493 - OAKENDEN MAIN CHANNEL DISTRIB - 21ETO10 Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA) Control Equip Option Analysis AM11_G04	✔	✔	✔	✘	$159	$117	$42	73%	Systemic (High Cost Estimate)
All Projects Reviewed					**$6,522**	**$1,303**	**$5,219**	**20.0%**	
Project Specific/ One-Off Adjustments					**$663**	**$405**	**$258**	**6.2%**	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						**$107**		**1.6%**	

Figure 22 Summary of Forward Project Reviews in the Price Path Period

The total recommended adjustment for systemic issues identified in the price path period is 1.6%. This particular systemic adjustment is based on one project in this particular period, however this deduction has been recommended as a systemic adjustment due to similar systemic cost estimation issues which have been observed in two other projects in the transitional period and four other projects in the beyond price path period.
Additionally, the total project-specific adjustment is $405,000 and reflects adjustments to three projects.

Project	Prudency Assessment	Efficiency Assessment			Total, FY25-53 $FY2019 '000s				Deduction Type
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	
0000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review - Burdekin Falls Dam	✔	✔	✔	✔	$141		$141		
0000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes $5k for elec. insp.), see notes.	✔	✔	✔	✔	$720		$720		
0000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	✔	✔	✔	✔	$736		$736		
0000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	✔	✔	✔	✔	$355		$355		
0000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	✔	✔	✔	✔	$345		$345		
0000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	✔	✔	✔	✔	$385		$385		
0000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020	✔	✔	✔	✔	$572		$572		
0000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec, See notes.)	✔	✔	✔	✔	$875		$875		
0000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy ($41,595 / yr) (P2)	✔	✔	✔	✔	$1,146		$1,146		
0000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) -Large cost associated with draining dissipator	✔	✔	✔	✔	$802		$802		
0000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✔	✔	✔	✔	$651		$651		
0000048336 - PETER FAUST DAM - Study: 20yr Dam Safety Rview (by 1 Dec 2023) incl. tasks mentioned in notes	✔	✔	✔	✔	$387		$387		
0000048820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	✔	✔	✔	✔	$260		$260		
0000077561 - TINAROO DAM - Testing of post tensioning permanent strand anchors	✔	✔	✔	✔	$673		$673		
0000058091 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	✔	✔	✔	✔	$266		$266		
0000064557 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	✔	✔	✔	✔	$848		$848		
0000064960 - LESLIE DAM - Replace Crane Control Equipment	✔	✔	✔	✔	$167		$167		
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✔	✔	✔	✔	$1,197		$1,197		
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	✔	✔	✔	✘	$2,467	$959	$1,508	39%	Project Specific
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✔	✔	✔	✔	$1,846		$1,846		
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✔	✔	✔	✔	$959		$959		
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 ($24,052/yr) (P2)	✔	✔	✔	✔	$655		$655		
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	✔	✔	✔	✔	$330		$330		
0000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattonvale PSTN	✘	✔	✔	✘	$451	$411	$40	91%	Systemic (High Cost Estimate)
0000072774 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	✘	✘	✘	✘	$272	$272		100%	Captured by Annuities
0000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	✔	✔	✔	✔	$426		$426		
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✔	✔	✔	✔	$1,474		$1,474		
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✔	✔	✔	✔	$1,624		$1,624		
0000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review -Burdekin Falls Dam (2018-2020 Project)	✔	✔	✔	✘	$158		$158		Systemic (High Cost Estimate)
0000042159 - WEST BARRON DISTRIBUTION - Replace Pipe Cherry Ck Siphon	✘	✘	✔	✔	$6,722	$6,722		100%	Captured by Annuities Review
0000076329 - SYSTEM - 24BIA20 Isis System - Refurbish - BIA-ISIS - ISIS - Irrigation Common Strategy Concrete Ch (30Yr Pln) (Item 2.0)	✔	✘	✔	✘	$2,188	$1,395	$793	64%	Systemic (High Cost Estimate)
0000042409 - WEST BARRON DISTRIBUTION - Replace Syn/Lin Chnl 38142.67-40917.1M	✔	✔	✔	✔	$1,402		$1,402		
0000015276 - TOM FENWICK PUMP STATION 4/5 - Replace Reduction Gearbox	✘	✔	✔	✔	$1,068	$529	$539	50%	Driven by Annuities Review
0000015210 - TOM FENWICK PUMP STATION 2/3 - Replace Pump No.2	✘	✔	✔	✔	$1,903	$1,903		100%	Driven by Annuities Review
0000030670 - ISIS DISTRIBUTION - Replace Pipe From 1535.00 To 5250.74M	✘	✔	✔	✔	$1,399	$1,399		100%	Captured by Annuities Review
0000030689 - DON BEATTIE PUMP STATION - Replace Common Control System STG I	✘	✔	✔	✔	$784		$784		Driven by Annuities Review
0000025738 - MONDURAN PUMP STATION - Replace Pump	✘	✔	✔	✔	$886		$886		Driven by Annuities Review
0000015726 - CLARE IRRIGATION DISTRIBUTION - Replace Pipeline 1352.0 - 4307.0	✘	✔	✔	✔	$1,394	$1,394		100%	Driven by Annuities Review
0000015177 - TOM FENWICK PUMP STATION 1 - Replace H V Switchboards	✘	✔	✔	✔	$538		$538		Driven by Annuities Review
0000014241 - MILLAROO IRRIGATION DISTRIB - Replace Concrete Lining	✔	✘	✔	✘	$1,321	$768	$552	58%	Systemic (High Cost Estimate)
0000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	✔	✔	✔	✔	$135		$135		
0000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - [redacted]Options Study Review Report' Doc Ref #2242568 Option #4	✘	✔	✔	✔	$327		$327		Driven by Annuities Review
0000045622 - ARRIGA DRAINAGE - Replace Earth Drain 1845.00-3765.00M	✘	✔	✔	✘	$340	$340		100%	Captured by Annuities Review
0000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	✘	✔	✔	✔	$241	$98	$143	41%	Systemic (Timing)
0000042132 - WEST BARRON DISTRIBUTION - Replace Scour Valve 1275.59M	✘	✔	✔	✔	$119		$119		Driven by Annuities Review
0000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	✔	✔	✔	✔	$109		$109		
All Projects Reviewed					**$42,067**	**$15,749**	**$26,318**	**37.4%**	
Project Specific/ One-Off Adjustments					**$2,467**	**$959**	**$1,508**	**2.3%**	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						**$2,672**		**6.4%**	

Figure 23 Summary of Forward Project Reviews Beyond the Price Path Period

The total recommended adjustment for systemic issues identified in the period beyond the price path is 6.4% and is based on five projects.

Additionally, the total project-specific adjustment is $959,000 and reflects an adjustment to one project.

7.0 Annuities Assessment

This section presents a review of Sunwater's proposed renewal program for the price path period and beyond price path period which is used as the basis for calculating the annuity.

7.1 Sunwater's Approach to Planning Asset Renewal

Application of Sunwater's documented policies for planning and estimating asset renewal was reviewed in Section 4.2, and involves, in summary:

- Adopting a standard expected asset service life for each asset class
- Using this and the known age of each asset to plan for replacement at the expected end of service life, or at a standard fraction of that life if the asset is deemed to be a high risk asset
- Planning for refurbishment at intervals during the asset life, based on an approach intended to optimise lifecycle costs as documented in asset management plans
- Estimating the cost of replacement or refurbishment based on a review of similar work carried out recently

Sunwater's policy is to review scheduled refurbishment or replacement projects when the current year approaches 5 years before the scheduled timing, to make a full evaluation of the assets involved to confirm that current condition and other factors meet Sunwater's criteria for capital projects, and to prepare business cases for approval where appropriate.

Sunwater's approach and the findings of our review of Sunwater's policies and procedures as they relate to asset renewal suggest several tests of the renewal program in order to determine whether the renewal program is prudent and efficient:

1. Since we have concluded that the decay curve used by Sunwater is not a standard one, what would be the potential impact of using industry standard approaches (based on Weibull curves)?
2. An industry standard approach would involve asset replacement timing based on a stated risk tolerance for critical assets. What level of risk tolerance would enable Sunwater's assets (those included in the submission) to be maintained in a satisfactory state of good repair?
3. Is the renewal project data provided in its submission accurate and reliable?
4. Has Sunwater consistently applied its documented planning strategies to project renewal timing?
5. Is the cost estimation process used by Sunwater acceptable?

We address these points in this section. It should be noted that all dollar values have been converted from nominal values to current (FY19) dollars for this analysis.

7.2 Sunwater's Submission of Renewal Projects for the Annuity

Sunwater's revised submission presented to the QCA in June 2019 includes more than 11,000 individual projects for the schemes under review, for the period from FY21 to FY53.

Figure 24 is a summary of the investment required by the submission (in current dollars), separated for convenience into projects related to dams and weirs, and the remainder. The value of the projects scheduled for delivery in these schemes during the FY25-FY53 beyond price path period, is $932 million in $FY19.

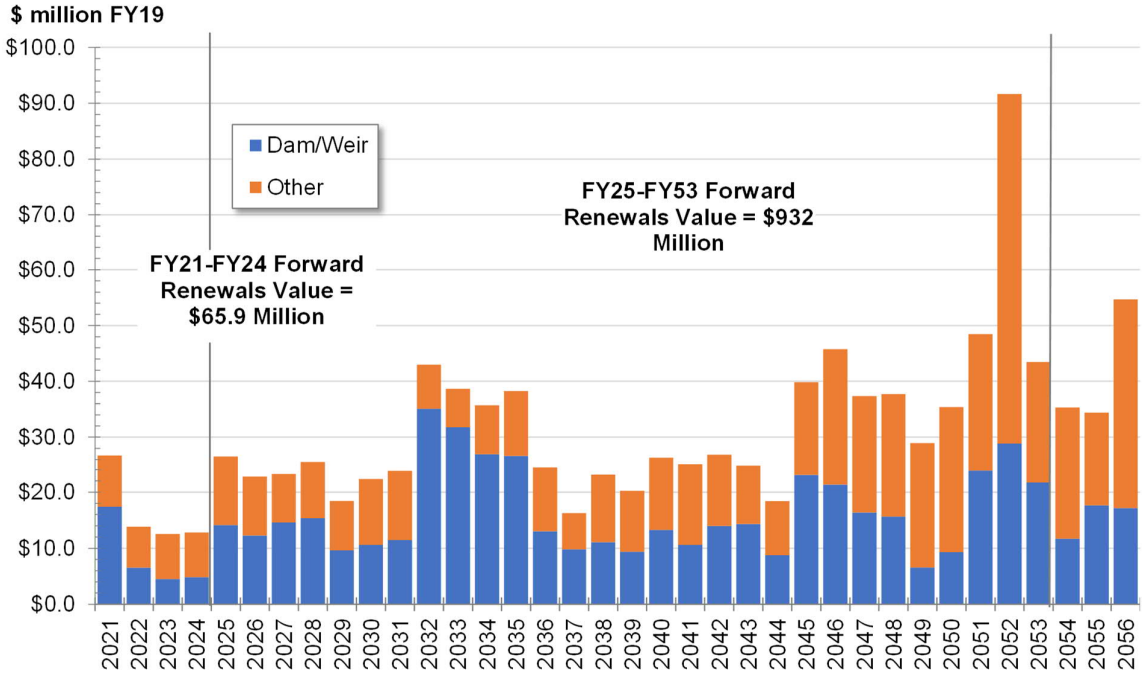


Figure 24 Total Value of Forward Renewals ($ million, FY19)

The revised submission includes projects with 5% lower total value overall (FY21-FY53) than the original submission, as indicated in Figure 25, where the original submission is shown in orange).

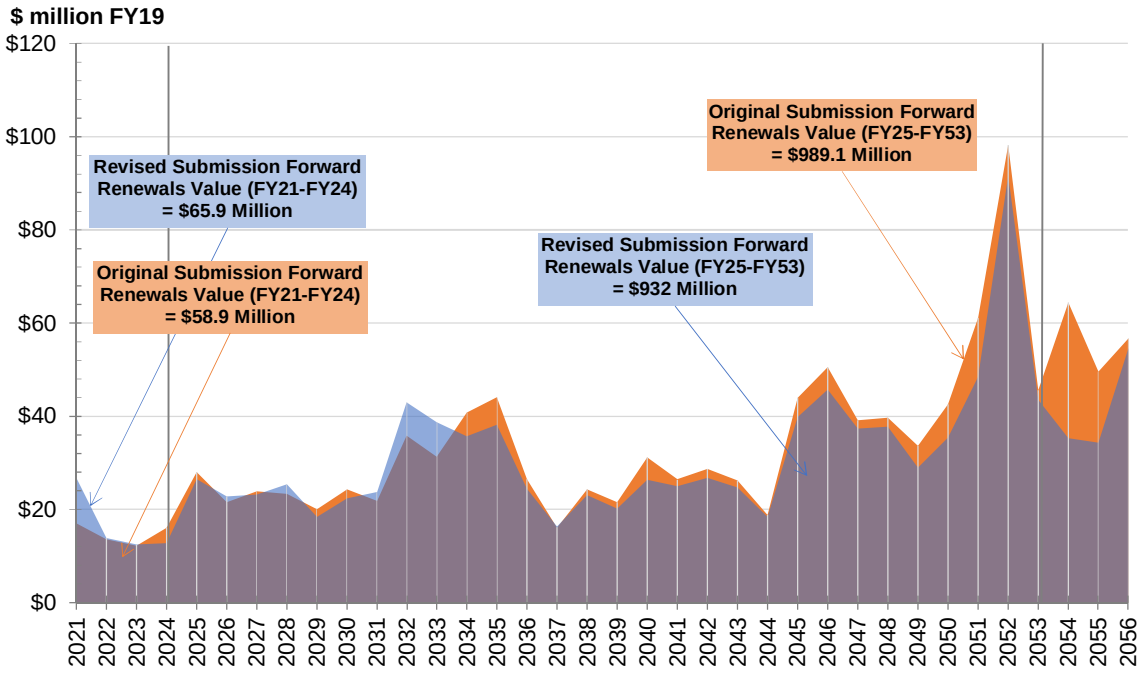


Figure 25 Revised vs original Submission of Forward Renewals ($ million, FY19)

The revision to the original submission (over the FY21-FY53 period) included:

- New projects costed at $157 million
- Projects removed, to a total cost of $157 million
- Adjusted renewal timing for 11% of projects (some projects delayed, and some brought forward)
- A revision of cost estimates for almost all projects, with projects included in both submissions on average decreasing by 6%

We note that there appear to have been significant omissions in the original submission. For instance, $12.7 million of flood damage remediation works to the spillway discharge channel at Fred Haigh dam (17BUN11) which were not included in the original submission have been included in the revised submission. The work is required as a result of rainfall and flood events due to cyclonic conditions in 2010/2011, 2013 and 2017 which caused significant scour in the unlined channel downstream of the concrete spillway structure. We note that the asset condition assessment for this asset recorded in June 2015 cites major scouring of the channel floor, and as such the required works should have been known well in advance of the development of the original submission. Significant changes between the two submissions presented to the QCA such as this example indicate that there may be shortcomings in Sunwater's procedures and processes for the forecasting of future works.

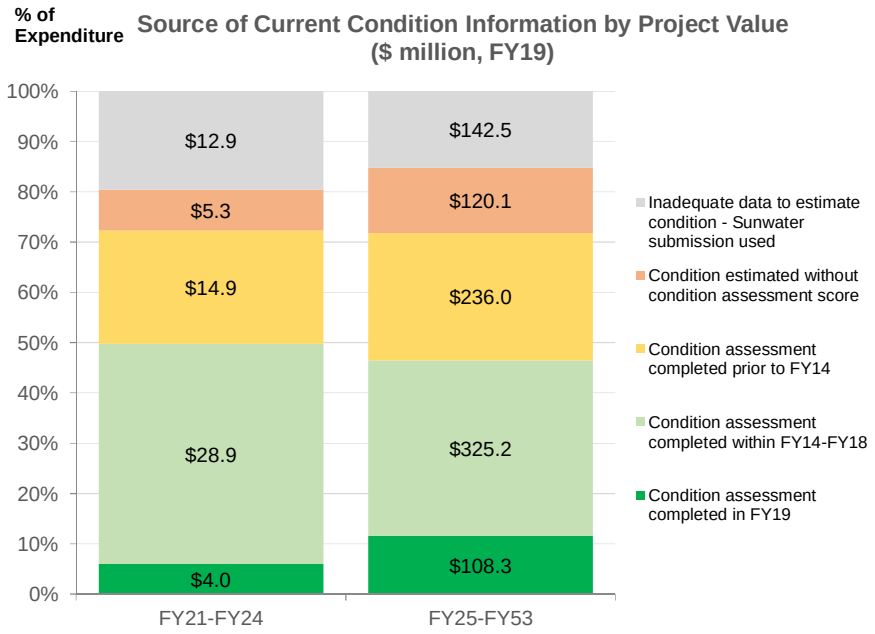
7.3 Assessment Approach

The adopted approach to reviewing Sunwater's proposed renewals program in its submission[62] is summarised in Table 25. Due to limitations of the high-level assessment approach outlined in Section 7.3.1, the annuity review is primarily a prudency assessment of renewal activities with regards to project timing.

Table 25 Renewals Assessment Approach for the Annuity

Stage	Steps
1.0 Collection of asset information	• Projects were matched to assets in Sunwater's asset register by functional location. • Asset object type, replacement cost, risk rating and condition assessment scores were obtained from the asset register as available.
2.0 Identification of Sunwater's investment planning strategies	• Sunwater's investment trigger points were obtained from Sunwater's *Whole of Life Maintenance Planning Strategy and Object Codes*[63] by using: - the asset object type, we obtained the expected useful life of the assets - the assessed asset risk, we obtained the investment trigger point.

[62] Reference: QCA Information Request 1_Attachment 1_Non-routine projects_30-year planning period v3.xlsx, June 2019
[63] Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS

Stage	Steps
3.0 Determination of current asset condition	• We used available asset condition assessment data, asset capitalisation dates, expected useful life (as per Sunwater's *Whole of Life Maintenance Planning Strategy and Object Codes*) and Sunwater's asset decay curve to model expected asset condition using Sunwater's lifecycle planning rules[64]. • To form a view on asset's current condition, the following approach was used: 1. Use condition scores as is, if asset condition assessments were completed in FY19. 2. Where asset condition assessment scores were recorded prior to FY19 (reported as, Prior to FY14 and between FY14-FY18), we converted the condition scores to percentage life expiry in the year of condition assessment in according with Sunwater's asset decay curve[65] and adjusted using the same approach to determine the expected condition in FY19 3. In instances where no condition assessment score was ever recorded, we used asset capitalisation date and expected useful life data to calculate current life expired and expected condition in FY19 using Sunwater's asset decay curve[66]. 4. In instances where current asset condition could not be derived due to non-availability of aforementioned data, we used Sunwater's renewals plan included in its submission, without adjustments. Figure 26 provides a summary of the source of condition information by project value.  **Figure 26 Source of Current Condition Information by Project Value – Projects in Renewal submission ($ million, FY19)**

[64] *Ibid*
[65] *Ibid*
[66] *Ibid*

4.0 Potential adjustments if Sunwater were to use Industry Best Practice delay curve methodology	**4.1 Testing hypothesis that Sunwater is planning for inefficiently renewing assets** Sunwater uses a propriety asset decay curve for all assets and use of this decay curve does not align with the industry best practice methodology of using Weibull curves by asset class. AECOM sought to determine potential impact of using a non-industry best practice methodology for assessing remaining life and asset condition in future years: • By projecting the asset condition forward from the FY19 base (outcome of Task 3.0) using one Weibull curve rather than using Sunwater's proprietary curve[67]. • Then by applying Sunwater's investment triggers we determined the resultant projected condition post investment in order to determine whether the level at which assets are being maintained is consistent with industry best practice. • If assets are being efficiently renewed, then their weighted average condition would lie in the 'adequate' range which AECOM considers as industry best practice. • We found that Sunwater assets' weighted average condition was higher than the target 'adequate' condition range supporting the hypotheses that Sunwater's assets are being planned to be over-maintained and therefore inefficiently renewed.
	4.2 Adjusting for Sunwater's use of non-industry best practice decay curve • AECOM adjusted the investment triggers for renewals in the AECOM tool so as to achieve the target 'adequate' condition range. We evaluated the impact of deferring investment triggers to be roughly equivalent to imposing a 10% increase in expected useful life using Sunwater's approach. • On this basis, we applied a 10% life extension to Sunwater's expected useful life to delay renewal works and measured the impact by doing so. Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater's investment planning strategies (as discussed at 5.0). The reduction in the total annuity amount is the potential adjustment.
5.0 Additional analysis into renewal activities which are not supported by projected asset condition	AECOM separately sought to determine the potential impact of adjusting the timing of renewals based on the projected asset condition using Sunwater's strategies, in order to: • Avoid delaying required works within the price path period, where a higher degree of planning takes place. • Determine whether the renewal project data provided in Sunwater's submission is accurate and reliable, and whether Sunwater has consistently applied its documented planning strategies to project renewal timing.
	5.1 Projecting of asset condition to the relevant year of future renewal Asset condition was projected forward from the FY19 base by using Sunwater's standard asset decay curve and expected useful life data[68].
	5.2 Assessing prudency of renewals timing in Sunwater's submission • We applied Sunwater's lifecycle planning rules[69] to the projected asset condition obtained in 4.1 and found that the resulting renewals program did not match the renewals timing in Sunwater's submission.
	5.3 Indicative adjustment of renewals timing based on projected asset condition • Where renewal works in Sunwater's submission were identified as being undertaken **earlier** when compared to outcome from 5.2 (i.e. as per AECOM's assessment), those renewals were delayed to the year when the projected condition will align with Sunwater's investment triggers[70] and the impact of doing so was modelled. • There are instances where renewals in Sunwater's submission were identified as being undertaken **later** when compared to outcome from 5.2 (i.e. as per AECOM's assessment), those renewals were modelled to have been brought forward in order to provide a balanced view.

[67] AECOM owns a propriety asset investment planning tool which uses one Weibull curve equivalent to a normal failure distribution order. AECOM uses this tool for a number of strategic asset management and investment studies.
[68] Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS
[69] *Ibid*
[70] *Ibid*

7.3.1 Issues Observed in Assessment of Renewals Timing

Issues, assumptions and limitations of the adopted renewals assessment are outlined in Table 26.

Table 26 Assumptions and Limitations of Renewals Assessment

<table>
<tr><th>Issue</th><th>Commentary</th></tr>
<tr><td>Classification of works</td><td>

Works in Sunwater's submission were classified as either 'replacement' or 'maintenance'. However, we note that some works listed as 'replacement' actually appear to be refurbishments or routine inspections, as based upon the project description and value of works to be delivered.
Due to inconsistent project naming conventions and numerous spelling discrepancies (such as refurbishment works being titled as 'Refrbish' and 'Refrubish' or 'Refrub') the projects in Sunwater's submission were manually classified in order to provide a more accurate annuity assessment
As indicated in Table 27, the classifications assigned to projects in the revised submission include replacement projects, refurbishment projects and inspections

Table 27 Summary of Projects Included in Submission by Project Type ($ million, FY19)
<table>
<tr><th>Type of Project</th><th>FY21-FY24</th><th>FY24-FY53</th></tr>
<tr><td>Replacement</td><td>$21.9</td><td>$482.0</td></tr>
<tr><td>Refurbishment</td><td>$35.5</td><td>$404.4</td></tr>
<tr><td>Inspection</td><td>$8.5</td><td>$45.6</td></tr>
<tr><td>Total</td><td>$65.9</td><td>$932.0</td></tr>
</table>

We have reviewed scheduled project timings for the projects classified as 'replacement' (approximately 50% of the total submission for the annuity)

</td></tr>
<tr><td>Documentation of Sunwater's asset management planning strategies</td><td>

Sunwater updated its lifecycle strategies for classes of assets and documented this in two documents; Overall Strategy Common to all Irrigation Schemes by Object Type and Overall Strategy Common to all Bulk Water Schemes by Object Type. [71] [72] Jacobs reports in the LMA Stage 3 Engineering Due Diligence Report [73] that the prior document was adopted in 2016, however neither document is dated, and it is unclear at what point the former revision to bulk water scheme assets occurred.
It appears that the investment triggers specified in the Whole of Life Maintenance Planning Strategy and Object Codes were not updated as they should have been
As the revised documents do not provide detail on trigger points for renewals, or the frequency for refurbishments, we have applied the investment triggers specified in the Whole of Life Maintenance Planning Strategy and Object Codes
Some examples of the observed inconsistencies between documentation are detailed in Section 7.3.3
Issues specifically relating to Sunwater's refurbishment planning strategies are addressed in Table 28

</td></tr>
<tr><td>Specification of works</td><td>

In many instances, works have been divided into different projects which make the overall project cost less transparent. Examples identified include:

Procurement, design and delivery/construction being separated into different projects
Construction part 1 and construction part 2 being separated into different projects

Sunwater have budgeted for the replacement of some assets based on annual rolling replacement programs (such as customer meters, which are in practice 'run to failure'), instead of determining replacement timing based upon asset age / condition.

</td></tr>
</table>

[71] RfI A1, Attachment 7.
[72] RfI A1, Attachment 8.
[73] Reference: *LMA Stage 3 Engineering Due Diligence Report*

Issue	Commentary
Assigned object codes	• It appears that some works are specified on high level assets / object types (such as *SCHEME*) for which useful life or investment triggers have not been specified • Where possible, for high level assets we have assumed useful life to be of the high-level asset (such as *HE - hydroelectric systems*) to be the average its relevant lower level assets, and have calculated renewal triggers from this • Additionally, we have some identified instances where the object code is missing or appears inaccurate
Risk	• We have assumed asset risk to be low where no risk assessment data for the relevant asset is available
Impact of improvements to decay curves	• Sunwater does not have decay curves for each asset class and does not use asset failure data to develop or refine the decay curve it is using, as would be expected by best practice. The scope of this review does not include development of alternative curves, so for the purposes of this review we have used a single Weibull curve. We expect this to be an improvement on Sunwater's approach, but it can only be used as an indication of the outcome if this approach were to be used, because it assumes that all asset failures will follow a similar distribution (which is unlikely to be the case in practice).
Instances where we are unable to establish asset condition	• There are instances where we are unable to establish, or project, asset condition due to the being no available capitalisation data, condition assessment data, and / or useful life data • In these cases, we have not made adjustments to Sunwater's proposed renewal timing
Constraints of undertaking an efficiency assessment	• Due to the lack of detail made available with regards to the scope of works to be delivered and the basis for cost estimates, in this section we have not sought to make adjustments to Sunwater's submission reflecting assessment of efficiency. Instead, efficiency is addressed through systemic issues identified through detailed project reviews, as summarised in Section 6.0. The review presented in this section is primarily a prudency review relating to project timing.

7.3.2 Issues Associated with Review of Planned Refurbishments

Additional to the topics discussed in Table 26, there are issues associated with reviewing Sunwater's planned refurbishments program on a portfolio level. These are outlined in Table 28. We have not in this section made adjustments to the timing of Sunwater's proposed works which we have classified as refurbishments. Further, we have not in this section made adjustments to the timing of Sunwater's proposed refurbishment works which we have classified as inspections.

Table 28 Issues Associated with Review of Planned Refurbishments

Issue	Commentary
Scope of works	• Limited information has been provided on the type or scope of works to be delivered for each project included in Sunwater's submission
Inadequate documentation of investment planning rules	• In many cases, Sunwater has not specified frequencies for refurbishment works to take place, or the types of work to be delivered • For instance, in the document labelled *Overall Strategy Common to all Bulk Water Schemes by Object Type,* Sunwater reports that it will maintain dam assets into perpetuity; however, this document does not detail the type or frequency of refurbishment works to be delivered. In the *Whole of Life Maintenance Planning Strategy and Object Codes*, which details investment triggers, refurbishment works are only specified for *Outlet Works* and *Spillway/Overflow Structures* within the *DAM* object type.
Lack of historical information	• In some instances where the frequency for refurbishment of object types is provided, there is more than one refurbishment expected to occur over the expected useful life of the asset. We do not know when, and if, the last refurbishment was undertaken and hence when the next refurbishment is due using Sunwater's lifecycle planning rules.

7.3.3 Inconsistencies in Documentation of Lifecycle Strategies

It appears that the investment triggers specified in the *Whole of Life Maintenance Planning Strategy and Object Codes* were not updated as they should have been when Sunwater updated its lifecycle strategies for classes of assets. Some examples of the observed inconsistencies are detailed in Table 29.

Table 29 Inconsistencies in Lifecycle Strategy and Methodology

Asset description	Reported Existing strategy	Reported New strategy [74] [75]	Review of Investment Triggers [76]
Dam and structural components	Replace on 80 to 200 year interval based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater has not specified specific thresholds for refurbishment of dam assets. Sunwater still reports replacement at end of useful life (200 years)
Weirs and barrages	Replace on 50 to 125 year interval based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater has only specified thresholds for refurbishment of same weir and barrage assets. Sunwater still reports replacement at end of useful life.
Hydro electric systems	Replace on 60 year interval and refurbish after 15 years based on condition and risk	Replace on 30 year interval and refurbished as required based on condition and risk	Sunwater still specifies useful life for hydroelectric systems at 60 years
Hydraulic systems	Replace on 60-year interval and refurbish after 20 to 30 years based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater still specifies useful life for hydraulic systems at 60 years
Mild Steel Unlined Pipe	Replace at full replacement cost at standard asset life 60 years	Adopt asset life of 80 years subject to condition and risk assessment, NPV of pipe leaks on a case by case basis	Sunwater still specifies a 60 year useful life for Mild Steel Unlined Pipe and two refurbishments per lifecycle (every 20 years)
Concrete lined channels	Replace at full replacement cost at standard asset life 80 years	Concrete channels are not replaced at end of life but are subject to ongoing refurbishment over time. Concrete lined channels at 40 years after construction will be refurbished within 100 years (assumed revised design life) therefore divide total replacement cost by 60 years. Then place this in the plan to replace and repair bays on a 5 year frequency.	Sunwater still specifies an 80 year useful life for Concrete lined channels and three refurbishments per lifecycle (every 20 years)

[74] RfI A1, Attachment 7.
[75] RfI A1, Attachment 8.
[76] Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS

7.3.4 Cost Estimates

Sunwater's procedures for developing cost estimates for projects scheduled later than the price path provide for the use of the recorded asset replacement cost, or the actual costs incurred in a similar project to be used as the basis for the cost provision for a future project. These preliminary cost estimates are reviewed in detail when the scheduled project falls within the next five-year period.

Review of the cost estimates recorded for projects that appear to be similar shows considerable variation in cost estimates (refer to Figure 27 as an example). This suggests that Sunwater's procedures are not being followed consistently.

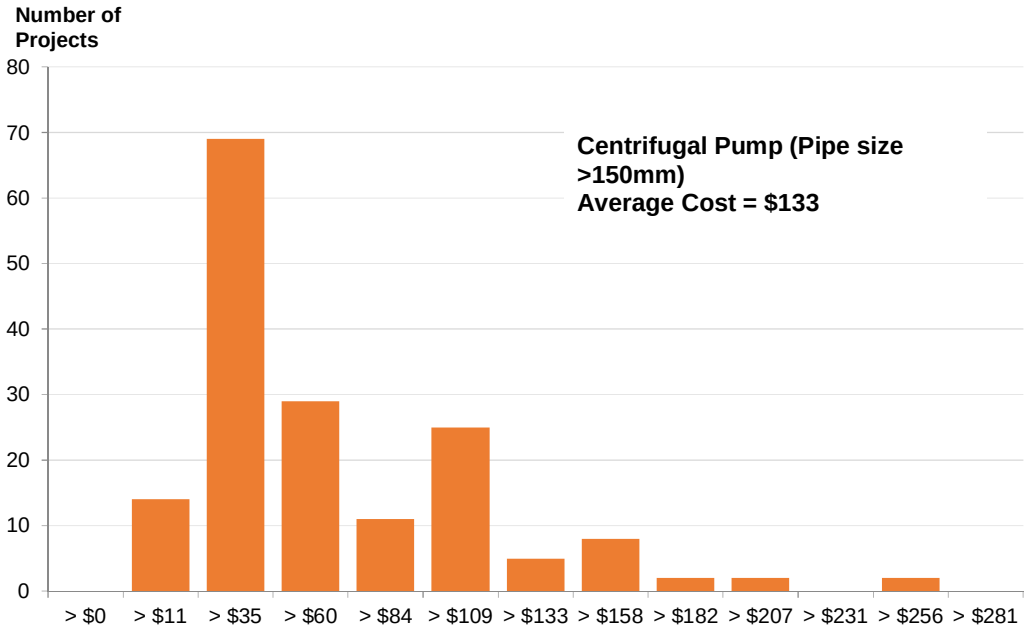


Figure 27 Variability in Cost Estimates ($'000s, FY19)

The timing and value of future projects must be considered to have a decreasing level of confidence the farther out they are in the future, because a wide range of factors are increasingly unlikely to remain as currently planned. As noted in Section 4.8.2, it appears that Sunwater does not use any form of probability assessment for different scenarios as a means of deriving expected costs.

it is recommended that Sunwater improves the consistency of its cost projections for projects in the annuity period, and to consider the use of probability-based scenario planning to derive expected costs for material items. Due to the lack of detail made available with regards to the scope of works to be delivered and the basis for cost estimates of all of the projects included in Sunwater's submission, in this section we have not sought to make adjustments to Sunwater's submission reflecting project cost. Instead, cost efficiency is addressed through the extrapolation of systemic issues identified through detailed project reviews, as summarised in Section 6.0.

7.4 Potential Adjustments if Sunwater were to use Industry Best Practice Decay Curve Methodology

This section tests the hypothesis that Sunwater is planning for inefficiently renewing assets and provides an adjustment to the annuity to reflect Sunwater's use of non-industry best practice decay curve.

7.4.1 The Impact of Sunwater's Proprietary Decay Curve

We have noted that Sunwater is not using a standard approach to predicting changes in asset condition through the lifecycle. In the absence of a set of evidence-based Weibull curves for each major or critical asset class, we have modelled the renewal of Sunwater's assets included in its revised submission using in-house tools, using a Weibull curve equivalent to a normal failure distribution to indicate the deterioration of assets through their lives, and use this to indicate the impact of the different approaches to planning for asset renewal.

Our modelling is designed to enable optimisation of funding and overall risk of failure, using asset condition (in this case) as a proxy for the risk of failure. The approach is based on an expectation of failure distribution and the implied deterioration of the asset over its lifecycle, where the failure distribution would normally vary by asset class and be informed by actual evidence (experience).

End of life is generally defined as the point in the lifecycle where the risk of failure becomes unacceptable (the assets can generally be used after that time, but service interruption will become more severe and maintenance costs will usually be significantly higher). Critical assets are held to a lower tolerance of risk, as indicated by the first vertical line in Figure 28.

With this approach, a decision on the timing of the renewal of a critical asset relies on the highest acceptable level of service interruption, often referred to in terms of service interruption frequency and duration. We note that both measures are needed for prudent and efficient asset management. This approach specifically enables future funding requirements (for asset renewal) to be related to minimum service levels.

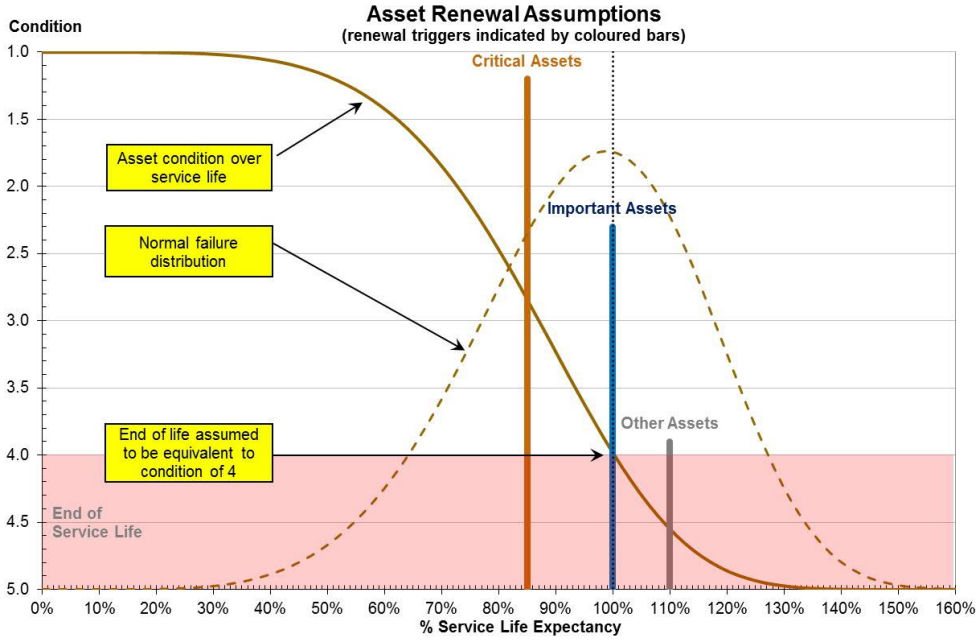


Figure 28 Example of Weibull Curve Equivalent to a Normal Distribution of Failure

Whilst there are noted deficiencies in Sunwater's data (Section 7.3.1), this analysis has been conducted to determine whether Sunwater is overly-conservative in the timing of renewals with respect to Sunwater's current asset decay curve and asset replacement strategies. Given issues encountered

with the data, this assessment and adjustments made in light of this assessment are conservative (for instance excluding refurbishment works and excluding works where we have inadequate information to determine projected asset condition).

The result of copying Sunwater's annuity program data into an AECOM asset investment planning model which use a Weibull curve as the basis for developing lifecycle costs is shown in Figure 29. The figure shows the investment required each year (in current dollars) aggregated by asset criticality, and shows:

- a solid brown line that indicates the weighted asset condition (for all assets in the submission scheduled for renewal, weighted using replacement value) assuming that no investment takes place
- a dotted brown line that shows the weighted asset condition after the scheduled investment (renewal). This line indicates a higher mean asset condition, because deteriorated assets are replaced with new assets.

The range of asset condition between the ratings of 2 and 3 is often referred to as the 'State of Good Repair', and generally infrastructure maintainers are advised that it is prudent and most cost-effective to maintain their assets in that range (allowing the weighted average condition to deteriorate below the rating of 3 on this scale increases the risk of failure, and allowing it to improve past 2 is generally a more expensive option than necessary (noting that the rating of 4 is defined as 'end-of-life', where the risk of failure is no longer acceptable.

The dotted black line is a trend line of annual investment needed. It increases because higher value assets with longer service lives fall due for renewal later in the planning period.

The renewal program as configured in this model, which applies Sunwater's renewal strategies, would typically keep the weighted asset condition above the State of Good Repair range, suggesting that the condition of assets is being maintained at too high a level using Sunwater's existing strategies.

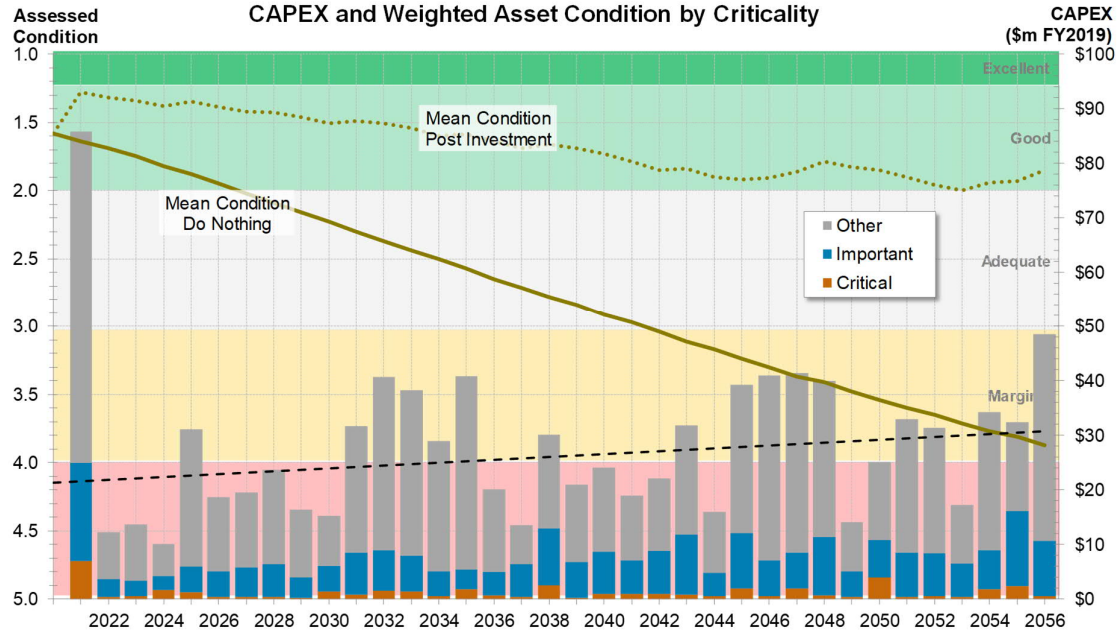


Figure 29 Sunwater's Annuity Program Developed Using an AECOM Model, Presented by Asset Criticality

Figure 30 presents the impact of applying a 10% deferment (delay in renewals). The renewal program as configured in this model, applying the 10% deferment in renewal timing, would typically keep the weighted asset condition closer to the top of the State of Good Repair range.

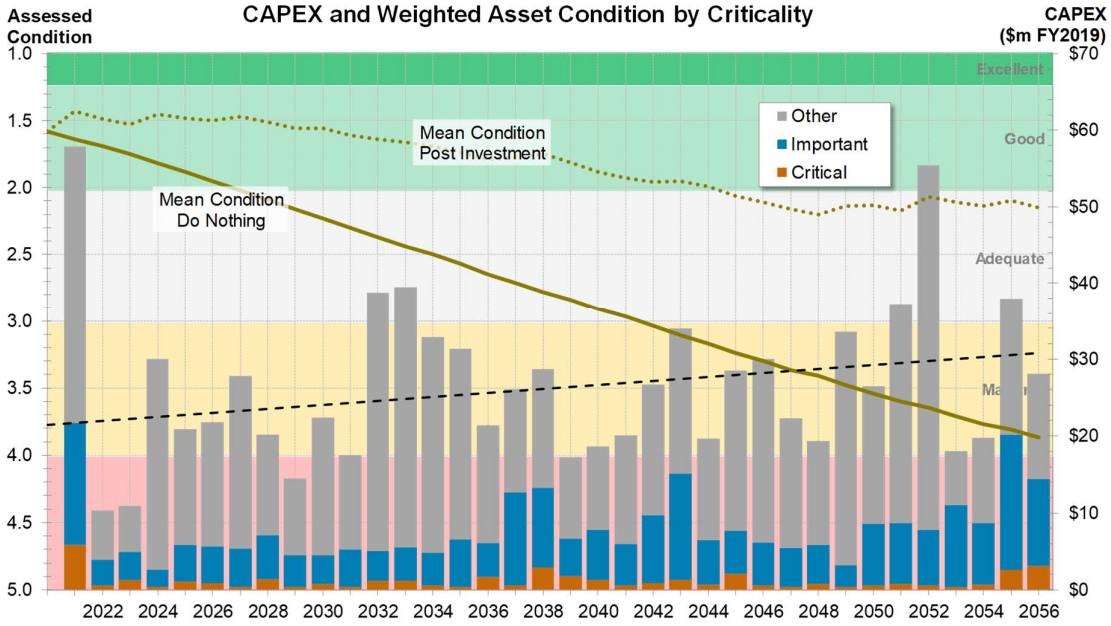


Figure 30 Sunwater's Annuity Program Developed Using an AECOM Model, Applying a 10% Renewals Deferment

The figures presented in these charts are for illustrative purposes to indicate projected post-investment asset condition; the annual values in these charts vary to those in Sunwater's submission and in our adjusted submission, mainly due to:

- The specification of a differing decay curve; in this case a single Weibull curve reflecting typical infrastructure failure rates
- The application of a risk based method to determine prudent renewal timing for critical assets. Misalignment exists between the renewals timing specified in Sunwater's submission and the timing implied by Sunwater's renewal strategies and asset condition projected using Sunwater's data (discussed in Section 7.5)
- The aggregation of Sunwater's asset and project data by type of asset rather than using discrete assets for simplicity

It may be useful to note the current condition of the assets included in Sunwater's submission. This is shown in Figure 31, which positions Sunwater's assets according to weighted condition by asset class, where the bubble size indicates the value of each class of assets. The bubbles are presented using the same Weibull curve as used in the previous charts from our model to indicate the approximate stage in their lifecycle.

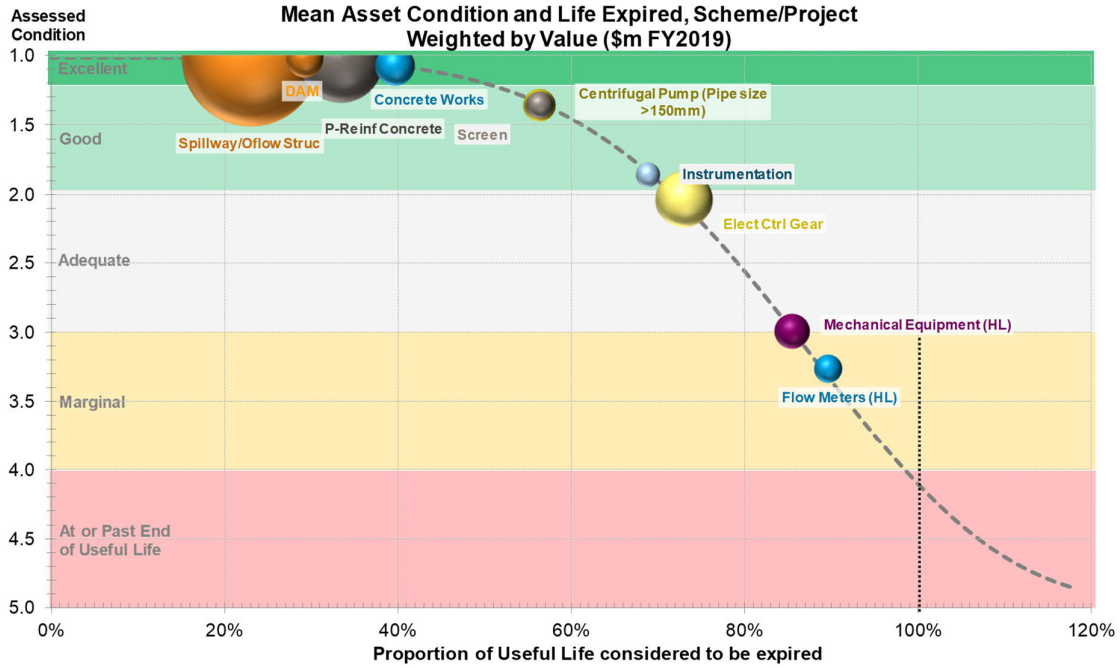


Figure 31 Current Condition of Sunwater's Assets Included in the Annuity Submission

For comparison purposes, the current condition of the assets included in Sunwater's submission is also presented using Sunwater's standard decay curve and Sunwater's condition rating definitions in Figure 32. We note that Sunwater's standard decay curve is notably steeper to the more typical Weibull curve we have employed. We note that both curves assume that asset failures will follow a similar distribution (which is unlikely to be the case in practice).

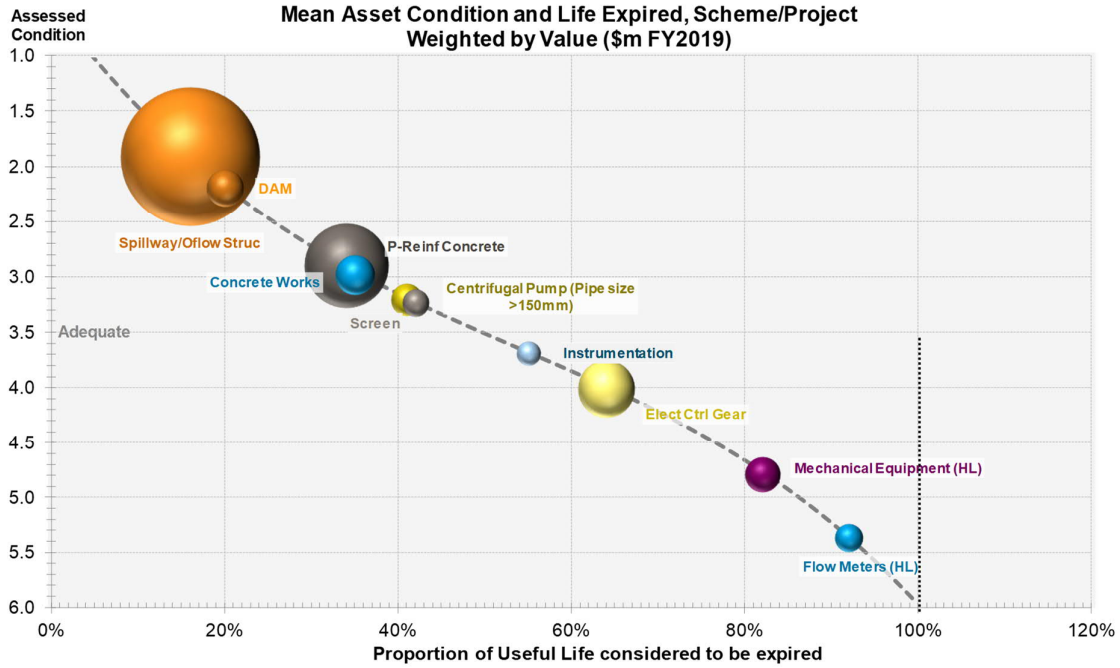


Figure 32 Current Condition of Sunwater's Assets in the Annuity Submission Modelled Using Sunwater's Decay Curve

7.4.2 Adjusting for Sunwater's use of Non-Industry Best Practice Decay Curve

We have noted that we have not seen evidence of asset failures that could be used to justify Sunwater's asset life expectancies. Sunwater's revised strategy documents that include the asset life extension do not provide the rationale used, and since there is no evidence of asset failure, we have concluded that the life expectations now in use may not reflect reality as experienced by Sunwater.

In consideration of the analysis conducted in Section7.4, we have applied a 10% increase in life expectancy, to indicate the potential impact of applying a higher tolerance for risk of failure. In practice, a prudent and efficient infrastructure operator would have developed failure curves based on history for each asset class.

Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater's investment planning strategies (as discussed at Section 7.5).

As indicated in Figure 33, the value of the annuity reduces to $59.7 million and $755.6 million for the price path period and beyond price path period respectively. As indicated in Figure 34, the annuity value is sensitive to asset life expectancies.

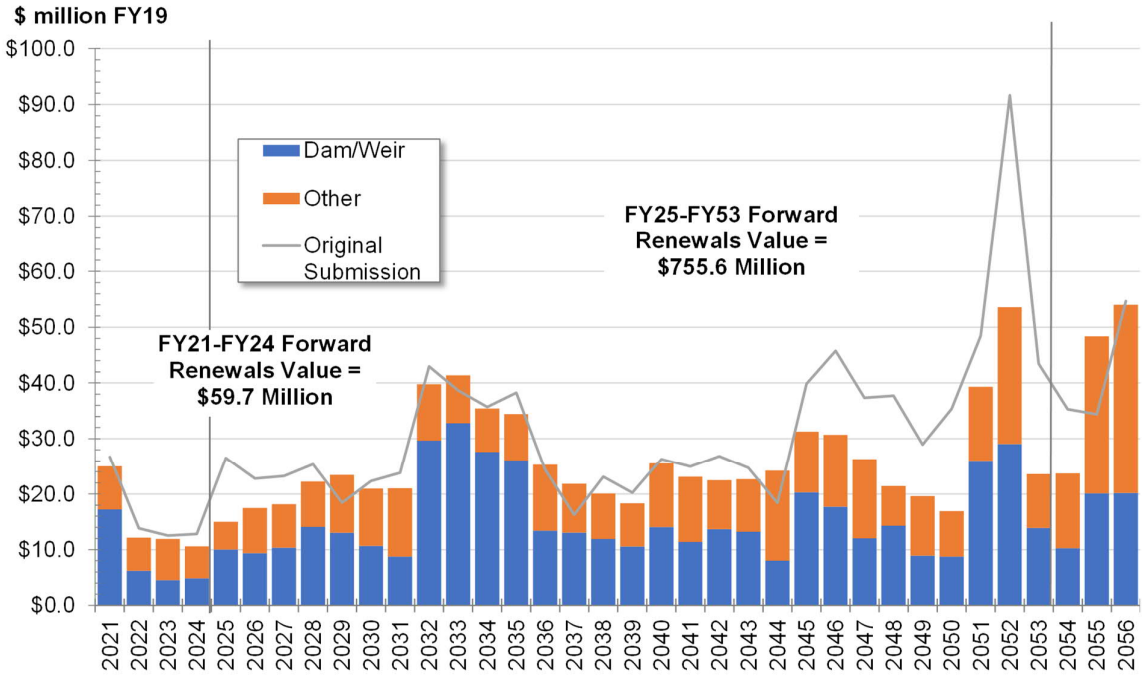


Figure 33 Revised Forward Renewal Program Applying a 10% Increase in Useful Life ($ million, FY19)

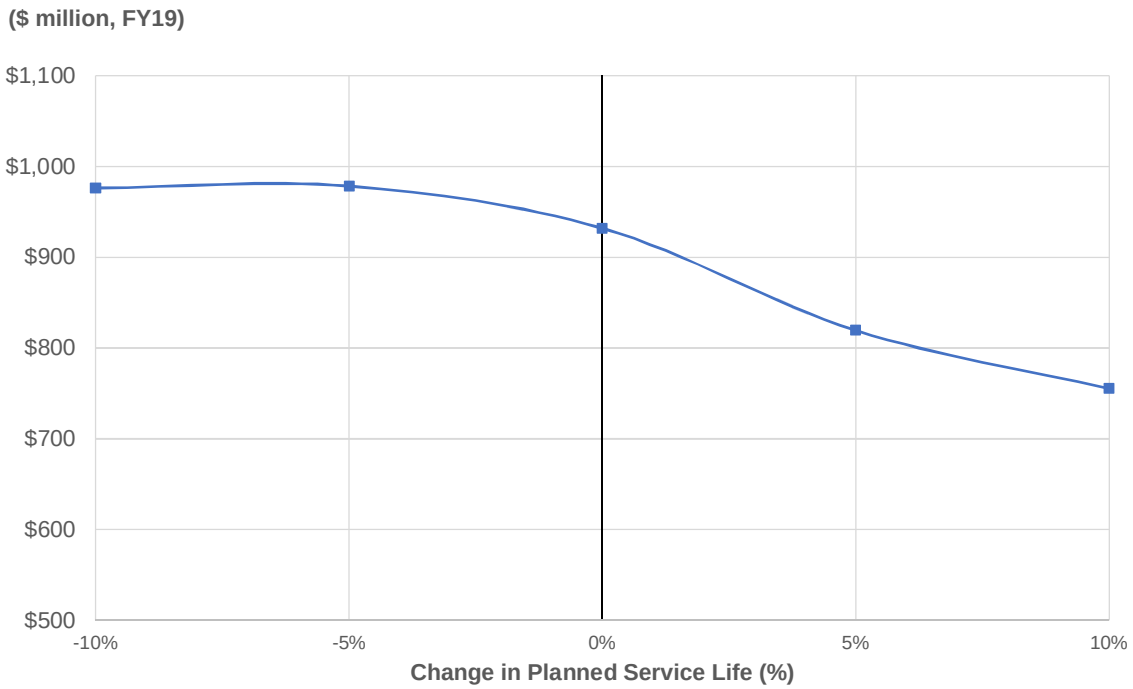


Figure 34 Sensitivity of Sunwater's FY25-FY53 Forward Renewals Value to Changes in the Service Life Expectancy of Assets to be Replaced

7.5 Additional Analysis into Renewal Activities which Are Not Supported by Projected Asset Condition

This section presents a separate analysis into the extent to which renewal activities are supported by projected asset condition and Sunwater's documented strategies, in order to:

- Avoid delaying required works within the price path period (where a higher degree of planning takes place) in the adjustment made in Section 7.4 to reflect an increase in useful life
- Determine whether the renewal project data provided in Sunwater's submission is accurate and reliable, and whether Sunwater has consistently applied its documented planning strategies to project renewal timing

7.5.1 Condition Assessment

Sunwater has a documented methodology for completing condition assessments based on a 6-point scale:[77]

1 Perfect, as-new condition

2 Minor defects only

3 Moderate deterioration with minor refurbishment required to ensure ongoing reliable operation

4 Significant deterioration with substantial refurbishment required to ensure ongoing reliable operation

5 Major deterioration such that asset is virtually inoperable

6 Asset has failed and is not operable

In Section 4.2.2 we refer to issues noted by the QCA's consultants in 2012 on the quality and completeness of condition inspection data, and the impact of this on the accuracy of renewals planning. We find similar issues in our review of the revised submission.

We analysed the most recent condition assessment data available for each asset to determine the extent to which the proposed renewal works are supported by Sunwater's condition assessments, expecting that the majority of works planned for the medium term would have a recent condition assessment and that it was used as a basis for timing expectations.

We found, however, that 21% of the renewal/rehabilitation works (by project value) scheduled for 2021 (and 27% over the full price path period) in the revised submission do not have condition assessment data recorded against the relevant asset and do not appear to be supported by a condition assessment. For these assets, it appears that expected asset condition is based only on age.

We conclude that the quality of condition assessment data and the validation of works remains an issue.

7.5.2 Projected Condition at Renewal using Sunwater's Planning Approach

We modelled the projected asset condition of the assets being renewed / refurbished to assess whether the timing of the works included in Sunwater's submission is prudent, using the condition assessment data available (adjusted for the proposed project timing using Sunwater's decay curve), asset age, asset life expectancy (as specified in the *Whole of Life Maintenance Planning Strategy and Object Codes.*[78])

Figure 35 and Figure 36 present the value of the Sunwater's proposed renewal and refurbishment works programs respectively, showing the predicted asset condition at the planned time for renewal. The predicted asset condition (using Sunwater's criteria and decay curve) is colour-coded, ranging from one (as new, in green) to six (at end-of-life, in dark brown).

[77] RfI A1, Attachment 4. *Asset Refurbishment Planning: Methodology for Condition Assessments of Assets.*
[78] RfI A1, Attachment 2.

Our analysis finds that 15% of the planned works (by value) are for assets where the projected condition assessment data is expected to be a condition state of 3 or better at the time of renewal, which using Sunwater's standard decay curve represents assets which have less than 37% of their life expectancy expired.

We assume that these will be deferred when the detailed review is undertaken, following Sunwater's documented policies and procedures.

We note that Sunwater has specified triggers for replacement of assets according to the assessed risk (or criticality) of the assets, which provide for renewal of 'high risk' (the most critical) assets when 63% of their expected life has expired, or approximately equivalent to a condition rating of four using Sunwater's criteria. Using this definition, there should not be any assets scheduled for renewal with a condition rating of less than four.

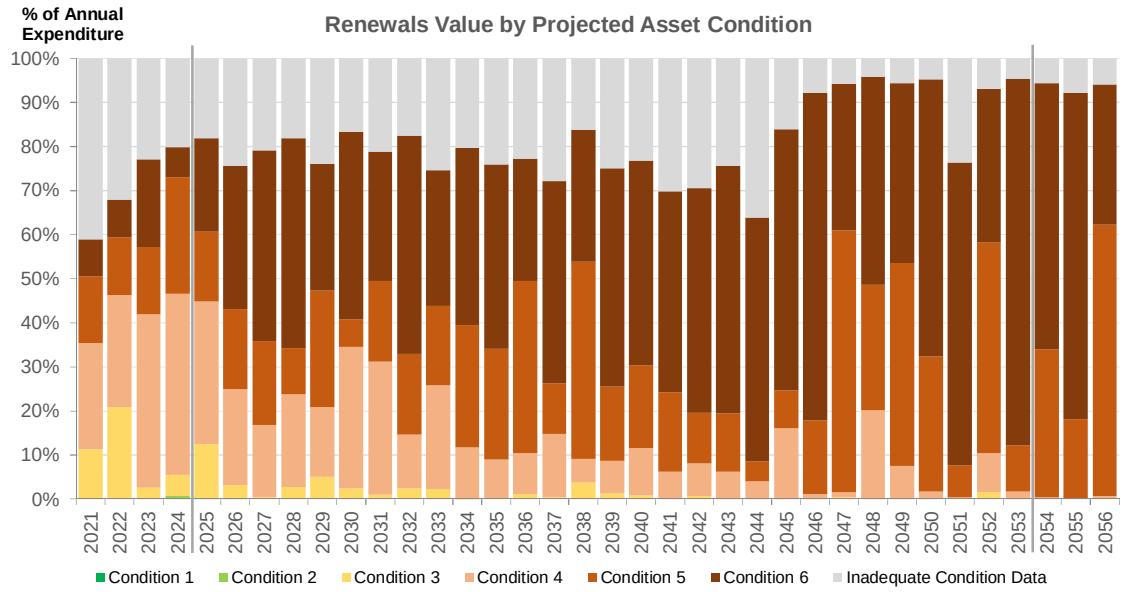


Figure 35 Sunwater's Proposed Renewals Expenditure by Predicted Asset Condition

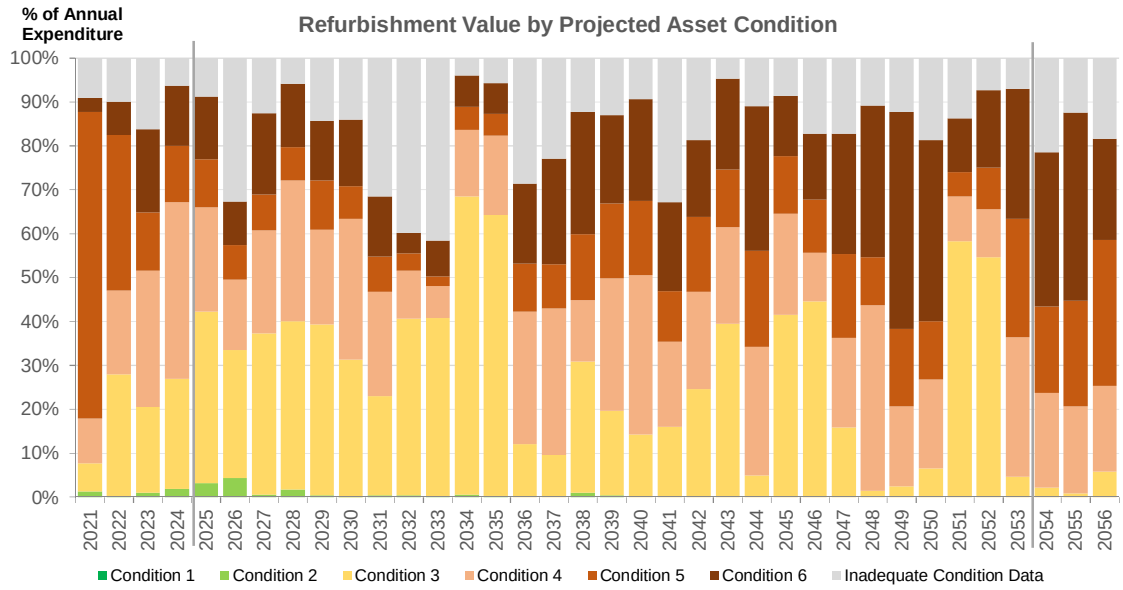


Figure 36 Sunwater's Proposed Refurbishment Expenditure by Predicted Asset Condition

Very limited information has been provided by Sunwater on the frequency of asset refurbishment (as opposed to renewal), the specific trigger points applied, or the actual scope of works expected to be undertaken.

These findings suggest that the timing of a substantial proportion of asset renewal / rehabilitation works is too early, and therefore not efficient. This provides further support to the adjustment made in Section 7.4.2.

7.5.3 Indicative Adjustments to Renewal Projections based on Projected Condition

We have applied Sunwater's rules to the proposed renewal projects as we believe they should have been applied, following Sunwater's own documented procedures. The result is shown in Figure 37, with Sunwater's revised submission shown as a line above the bars. A breakdown of the adjustments made due to the timing of projects is presented in Figure 38.

The revision reduces the value of the annuity to $52.5 million and $847.0 million for the price path period and beyond price path period respectively (in $FY19). This finding is in support of the adjustment made in Section 7.4.2, indicating that Sunwater's renewals program as submitted would result in over-maintenance of assets This adjustment based on projected condition is shown for indicative purposes only, and is considered to be captured by the adjustment made in Section 7.4.2 reflecting an increase in useful life.

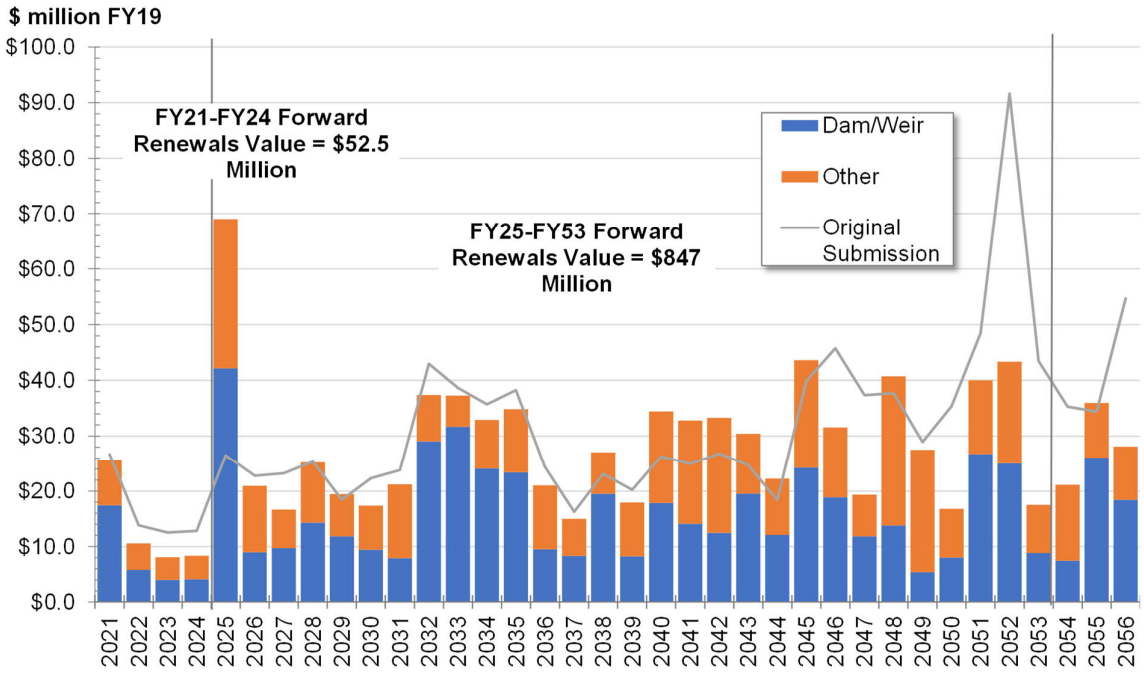


Figure 37 Revised Renewal Program Applying Sunwater's Rules ($ million, FY19)

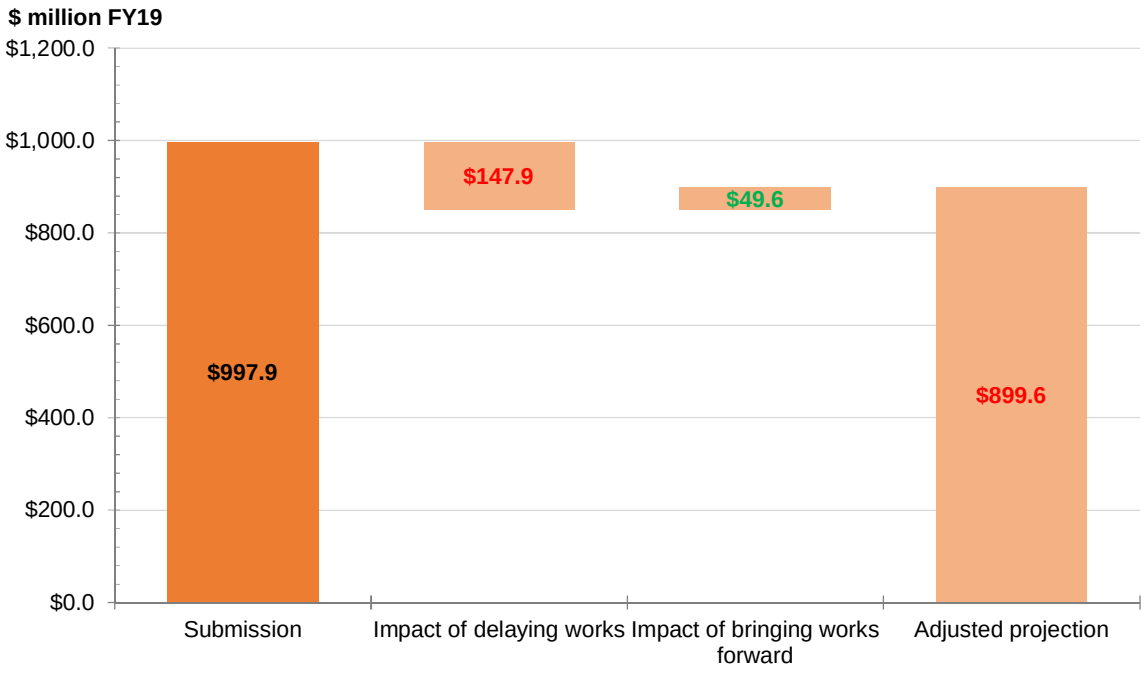


Figure 38 Breakdown of Adjustments made Applying Sunwater's Rules, FY21-FY53 ($ million, FY19)

The most significant issues noted in this indicative analysis due to projected condition occurred in distribution schemes, specifically; Bundaberg distribution and Mareeba-Dimbulah distribution.

Some noteworthy examples of the type of assets where projected condition implies a delay beyond FY53 include:

- Numerous replacement projects for long life civil assets such as pipes, channels, or drains from outer years in the beyond price path period:
  - The timing of many of these works does not appear to have been adjusted (or adequately adjusted) to reflect assessed condition
  - For some replacement projects the age of the asset does not warrant renewal according to Sunwater's documented strategies and there is no condition assessment available to justify early renewal
- Numerous centrifugal pump replacement projects from outer years in the beyond price path period. It appears that the timing of many of these works has not been adjusted to reflect assessed condition.

7.6 Conclusions

We have made a number of findings and recommendations in this section. In summary:

- We noted in our review of Sunwater's policies and procedures (Section 4.8) that if the purpose of the annuity is to smooth asset renewal and refurbishment costs over a period of time (for pricing purposes), then the period selected for the annuity should be similar to the lives of the highest value and longest lived assets involved. In practice Sunwater has assumed some of its assets have no end-of-life, and since planning for the very long-term introduces increases uncertainty, we consider a 30 year period for an annuity to be a reasonable compromise.

  We therefore recommend that the QCA specify a 30 year period for the annuity calculation.
- We have noted a number of issues with Sunwater's project program for the annuity, including inconsistent or deficient data classifications. Sunwater should be advised to address these.
- In relation to asset condition data, we have noted issues in the quality and completeness of asset condition assessment data similar to those noted by the QCA's consultants in the prior 2012 irrigation reviews (Section 4.2.2), and inconsistent use of condition assessment data to determine the timing of forward projects.
- We noted inconsistences in cost estimates (Section 7.3.4) for projects included in the annuity and recommend that Sunwater take action to improve its controls of this process.
- Sunwater extended service lives in revisions to its long planning strategies but has not provided adequate rationale for the basis of the extension. There does not appear to be evidence of analysis of failures that could inform a more rigorous establishment of asset performance over time or with usage.
- We recommend that our revision of Sunwater's data as indicated in Figure 33 be used for calculating the annuity. This would reduce the value of the annuity to $59.7 million and $755.6 million for the price path period and beyond price path period respectively (in $FY19). This adjustment is primarily a prudency adjustment to account for overly-conservative renewals timing.
- We recommend that Sunwater initiate a comprehensive review of failure distribution for its critical assets and use that to develop its own evidence-based deterioration curves. The proposed increase in asset service lives by 10% should be applied unless Sunwater can demonstrate that this would result in an unacceptable increase in service failures, and in practice it may be possible to continue increasing expected service lives until minimum service levels are achieved, which will indicate that life expectancies are realistic.

- We note that there seems to be no provision for asset renewal where unplanned failures occur. There will always be a risk of unplanned failures, and we would normally expect a provision to be made for these. We have no data to indicate past instances or levels of unplanned asset failure, and a high proportion of these are likely to be able to be resolved through maintenance using operational budgets. Since other avenues exist to recover the cost of these works if they occur, we do not recommend a change to the current status quo.
- We have noted the value of using service interruption frequency and also interruption duration in guiding asset management priorities.
- Sunwater currently does include maximum interruption frequencies in its NSPs that were derived in consultation with its customers. This should be guiding asset renewal (provided that the risk of exceeding this maximum is clearly defined and used in long-term planning). A maximum interruption duration target would provide guidance on response times, sourcing of essential components and other factors that affect asset management and enable more prudent and efficient management of Sunwater's assets.

8.0 Dam Safety Upgrade Project Assessments

8.1 Project Reviews

Two dam safety upgrade projects were reviewed under the project sample. The projects had costs in each of the review periods – historical (FY12-FY18), transitional (FY19-FY20), price path period (FY21-FY24), and beyond price path period (FY25-FY53). The projects have been reviewed on a whole-of-project basis, but costs have been disaggregated by period.

The project review summaries are provided in Appendix D. They consist of a description of each project's background, the options assessment process, its implementation, and the findings on prudency and efficiency.

The assessment forms for the dam safety upgrade projects are included in Appendix G. The assessment forms include specific information on cost estimating, cost control, project governance and implementation.

8.2 Themes and Systemic Issues Arising from Project Reviews

The two projects reviewed were at Burdekin Falls Dam and Fairbairn Dam. Both projects involve significant works with high capital expenditure in order to bring the dams' risk level to below the ANCOLD limit or Tolerability. While the projects share the same goal of risk reduction, the root cause underlying the need for each project is different.

The Burdekin Falls Dam Safety Upgrade is driven by an update to rainfall and flood projections by the Bureau of Meteorology. Higher extreme rainfall events are now expected compared to what the dam was designed for. As a result, the dam no longer complies with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity. Works are required to raise the dam level to reduce the risk to an acceptable level. The project was started in FY17 and is currently in the conceptual design and planning phase.

The Fairbairn Dam Safety Upgrade is driven by damage to the dam spillway that was discovered during various inspections, surveys, tests, and risk assessments completed from FY09 to FY17. Voids and subsurface drainage issues have led to the corrosion of anchors that presents a risk of uplift or transient pressures on the concrete slabs during flood events, which could in turn dislodge the concrete slabs and expose the foundation. Works are required to raise the dam level to reduce the risk to an acceptable level. The project was started in FY16 and is still under construction.

The project reviews concluded that both projects were considered prudent and efficient, but some project issues and areas for improvement were still observed.

1. **Project Planning and Design Rework**

   The Burdekin Falls Dam Safety Upgrade project was started in FY17. A Preliminary Business Case was completed and approved by the Sunwater Board in March 2017. A concept design report was completed in November 2018. It later had to be revised to account for a new hydrology assessment and a new approach for risk-adjusted approach to acceptable flood capacity. The revised concept design report and associated business case introduced completely new options and recommendations. The conclusions section of the Executive Summary (of the initial final report Nov 2018) references the ARR2016 report and in our view should have considered the results of the new 2016 hydrology requirements. This rework can be considered inefficient, especially since the hydrology is a critical input to the design. It is not clear why the hydrology assessment was not completed in advance of the concept design report.

   A similar early omission of key technical inputs occurred on the Fairbairn Dam Safety Upgrade project. Decisions were made to limit or forgo geotechnical and investigations early on in the project. Physical modelling was also deferred. The risk associated with rework due to inaccurate geotechnical, structural, or lack of physical modelling was likely not considered (or contingency amounts approved) and as a result, unplanned costs for design rework occurred.

Adjustments on the projects have not been made as the cost of the design rework was not provided and has been assumed as small compared to overall construction costs.

2. Cost Estimation and Documentation

The Burdekin Dam project had several versions of the total project cost estimate with discrepancies in the total project cost and the annual cost profile. Using the [redacted] Revised Concept Design Report as its reference, Sunwater prepared a Preliminary Business Case. Not only do cost estimates vary between the business case main document and its appendices, but it also differs from the Concept Design Report. Furthermore, the capital expenditure submission does not match any of the cost estimates from the supporting documentation.

For the Fairbairn Dam project, a large number of revisions the project budget and scope were needed over the course of the project. While these historical variations were mostly well justified and documented, the figures in the final budget approval document for the FY20 and FY21 costs do not match the figures in the capital expenditure submission for those years.

While the documentation is of a high quality overall, these types of cost variances between documents and lack of associated justification are consistent with the systemic issues identified for the renewals project assessments. We have not recommended cost adjustments due to the observed cost variances as;

- We consider the overall cost of the projects to be reasonable
- For the Burdekin Dam project, the total cost in Sunwater's submission was lower than that provided in the design report and business case where variations were observed
- The scope of the cost variation observed between Sunwater's submission and the budget approval document for the Fairbairn Dam project is considered to be reasonable giving consideration to the scale and complexity of the project

8.3 Conclusions and Recommendations

The review of the dam safety upgrade projects in sample generally show project prudency and efficiency has been appropriately justified. While some project issues and areas for improvement have been identified, the magnitude of the cost impacts would be small compared to full project costs. For that reason, no adjustments have been proposed.

A summary of the project reviews with costs separated by review periods is provided in Figure 39, Figure 40, Figure 41, and Figure 42. In these figures, the green colour coding represents the level of document quality.

Project	Prudency Asessment	Efficiency Asessment			FY16-18 Cost $FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgarde Works	✔	✔	✔	✔	$66.2		$66.2	
Burdekin Dam Upgrade Works	✔	✔	✔	✔				
All Projects Reviewed					**$66.2**		**$66.2**	

Figure 39 Summary of Dam Safety Upgrade Project Reviews for Historical Years

Project	Prudency Asessment	Efficiency Asessment			FY19-20 Cost $FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgarde Works	✔	✔	✔	✔	$80.5		$80.5	
Burdekin Dam Upgrade Works	✔	✔	✔	✔	$12.7		$12.7	
All Projects Reviewed					**$93.2**		**$93.2**	

Figure 40 Summary of Dam Safety Upgrade Project Reviews for Transitional Years

Project	Prudency Asessment	Efficiency Asessment			FY21-24 Cost $FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgarde Works	✔	✔	✔	✔	$21.0		$21.0	
Burdekin Dam Upgrade Works	✔	✔	✔	✔	$283.9		$283.9	
All Projects Reviewed					**$304.9**		**$304.9**	

Figure 41 Summary of Dam Safety Upgrade Project Reviews for the Price Path Period

Project	Prudency Asessment	Efficiency Asessment			FY25-53 Cost $FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgarde Works	✔	✔	✔	✔				
Burdekin Dam Upgrade Works	✔	✔	✔	✔	$35.1		$35.1	
All Projects Reviewed					**$35.1**		**$35.1**	

Figure 42 Summary of Dam Safety Upgrade Project Reviews for Beyond the Price Path Period

9.0 Summary of Conclusions and Recommendations

9.1 Policies and Processes

We have made a number of findings and recommendations in Section 4.0. In summary:

- We strongly recommend that Sunwater undertake a comprehensive assessment of asset failures and use the outcomes to define the decay curves that will be used in projecting its future renewal program
- We recommend that Sunwater review the process of selecting projects for options analysis with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for
- We recommend that Sunwater review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology
- With regards to procurement policies and procedures, we recommend that Sunwater:
  - Improve quality control of issued documents
  - Aligns its risk matrices among its various divisions
  - Require a written proposal / methodology for all procured services, the details of which can be aligned to the risk/complexity of the requested service
  - Include specific reference to bribery and facilitation payment prohibition in the Code of Conduct
  - To ensure Sunwater's policies and code of conduct provisions are consistent with best practice; the Code of Conduct should include specific reference to bribery and facilitation payment prohibition; staff training on the Code of Conduct should include bribery and facilitation payment prohibition references and training should be provided to all employees.
  - Improve its records Management Process
- With regards to project management, we recommend that Sunwater:
  - Standardise and simplify its P3MF maps and tools
  - Improve its P3MF process with respect to giving the warranted attention to the Monitoring and Control process of the project lifecycle

9.2 Renewals Projects Sample Review

9.2.1 Historical Renewals (FY12-FY18)

The overall recommended adjustment for the combined effect of the systemic issues for all 21 historical projects reviewed was 8.6%. This number includes the flood damage projects, which due to their innate urgency are not representative of the majority of Sunwater projects. The Boondooma Legal Insurance adjustment is clearly a project-specific adjustment as opposed to a systemic based adjustment.

The total adjustment when excluding the flood damage projects is 4.2%. This is based on 4 projects out of the sample of 17 projects. This number is more representative of an adjustment related to the systemic issues and could potentially be extrapolated to the full historical projects portfolio. An additional adjustment of $630,000 is recommended for flood damage projects.

9.2.2 Transitional Renewals (FY19-FY20)

The project reviews for the transitional and forward renewals were completed on a whole of project/ program basis. Project reviews often had costs in each of the three periods (transitional, price path, and beyond price path). That said, the costs and adjustments were disaggregated by period to establish recommended adjustments by period.

The total recommended adjustment for systemic issues identified in the transitional years (FY19-FY20) is 5.1% and is based on adjustments to five projects. Additionally, the total project-specific adjustment is $108,000 reflects adjustments to two projects. The sample comprised 36 projects.

The calculation of a percentage reduction for the systemic issues is based on the value of total adjustments recommended divided by the total value of all projects in the period. Any project-specific adjustments, of which there were two in the transitional years, have been identified and excluded from the systemic issues adjustment. Likewise, adjustments recommended for the same reasons as those in the annuities assessment have been excluded to avoid double counting.

9.2.3 Forward Renewals in Price Path Period (FY21-FY24)

The total recommended adjustment for systemic issues identified in the price path period is 1.6%. This particular systemic adjustment is based on one project in this particular period, however this deduction has been recommended as a systemic adjustment due to similar systemic cost estimation issues which have been observed in two other projects in the transitional period and four other projects in the beyond price path period.
Additionally, the total project-specific adjustment is $405,000 and reflects adjustments to three projects. The sample comprised 26 projects.

The calculation of a percentage reduction for systemic issues has been done using the same method as that for the transitional years. Three project-specific adjustments in the price path period years have been identified and excluded from the systemic issues adjustment.

9.2.4 Forward Renewals beyond Price Path Period (FY25-FY53)

The total recommended adjustment for systemic issues identified in the period beyond the price path (FY25-FY53) is 6.4% and is based on five projects. Additionally, the total project-specific adjustment is $959,000 and reflects adjustment to one project. The sample comprised 46 projects.

The calculation of a percentage reduction for systemic issues has been done using the same method as that for the transitional years. One project-specific adjustment in the price path period has been identified and excluded from the systemic issues adjustment.

9.3 Annuities Assessment

We have made a number of findings and recommendations in Section 7.0. In summary:

- We recommend that the QCA specify a 30-year period for the annuity calculation, giving consideration to long-asset lives.
- We have noted a number of issues with Sunwater's project program for the annuity, including inconsistent data classifications and inconsistent use of condition data, and recommend that Sunwater address these.
- We noted inconsistent cost estimating for projects included in the annuity and recommend that Sunwater take action to improve its controls of this process.
- We recommend that Sunwater initiate a comprehensive review of failure distribution for its critical assets and use that to develop its own evidence-based deterioration curves.
- The proposed increase in asset service lives by 10% as specified in Section 7.4.2 should be applied for calculating the annuity, unless Sunwater can demonstrate that this would result in an unacceptable increase in service failures.
- We have noted the value of using service interruption frequency and also interruption duration in guiding asset management priorities. We recommend that include maximum interruption frequencies in its NSPs and use these to guide asset renewal.

9.4 Dam Safety Upgrade Projects

A number of observations in the dam safety upgrade project reviews were made that would have improved project performance, but no adjustments were recommended. The observations were related to inefficiencies in the design phase and discrepancies in cost estimates and budgets. The magnitude of the cost impacts from these findings, for these particular projects, would be small due to the overall magnitude of the projects' construction costs.

9.5 Timeline and Data Challenges Experienced During the Review

The QCA engaged AECOM to undertake the assessment of the prudency and efficiency of the Sunwater's historic and forecast renewals expenditure in specified water supply schemes and distribution systems, and of forecast capital expenditure on dam safety upgrades as part of the Rural Irrigation Price Review 2020–24.

During the Inception Meeting undertaken in January 2019, the detailed project plan was finalised in consultation with the QCA. This plan called for a full draft report in mid-April and a final report in mid-May 2019. One of the biggest project risks mentioned in our proposal and considered in the subsequent project plan was related to availability of timely documentation and that the documentation is of sufficient quality to enable the desktop reviews.

This review has primarily been a desktop review, with several rounds of requests for additional documentation to clarify particular issues in relation to the projects being reviewed. A number of face-to-face meetings were also held to augment the understanding of the provided information or for clarifying the emerging queries.

AECOM appreciates Sunwater's approach to having a single point of contact for project queries and setting-up of a dedicated email address. Use of a central repository for data in form of 'SharePoint' set-up by the QCA was also very helpful.

However, AECOM wishes to note the data related challenges experienced during the review including, determination of representative project samples (the original submission contained over 90,000 project entries for the FY19-FY53 period. We consolidated this by maintenance code, resulting in a consolidated list of over 14,000 projects. We note that a number of these items related to the same project e.g. divided by stage or year but had different project numbers with no clear or consistent means of linking these); delays in the provision of information for projects in the review sample, wide-ranging changes to data during the course of the project (resultant of both the revised renewals submission and revisions in project documentation), many instances where there were gaps in the information provided or where the provided data was of poor quality and not readily usable, and had to be interpreted and manually manipulated to enable its use. The data challenges have been noted throughout the report. The lack of the full range of documentary evidence and the lack of consistency in those documents provided means that we have in many cases had to rely on professional judgement to make an assessment of prudency and efficiency and to assign a relatively low level of documentation quality to some of our findings.

Additionally, Sunwater provided a revised submission in June 2019, much after the project should have been finished as per the initial program in place. This required us to rework the analyses, compare the original November 2018 submission with new June 2019 submission and extract numbers from a mix of different data sets to undertake the level of analysis required for the benefit and thoroughness of the review. As a result, substantially increased time and effort was needed to ensure that AECOM was able to support the QCA in meeting the requirements of the ministerial direction.

We note that significant changes occurred in Sunwater's revised June 2019 renewals submission. As discussed in Section 7.2, we consider that a portion of this data should have already been accounted for in the original November 2018 submission. Given that this is not the first time that such a pricing review has been undertaken, it is reasonable to expect that Sunwater has a streamlined process for accumulating and disseminating the information required for such a review. We therefore suggest that Sunwater reviews the manner in which it prepares for such pricing reviews and that Sunwater develops internal procedures and processes that aids in a robust review for the benefit all stakeholders.

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Rural Irrigation Price Review 2020–24
Queensland Competition Authority
30-Aug-2019

Rural Irrigation Capital Expenditure Review [Appendices Only]

Sunwater

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Appendix A

Project Reviews for Historical Renewals

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07PIO05 – Palmtree Creek Outlet Works

Project Overview

The replacement of the regulating valve RV01 of the Palmtree Creek Pipeline undertaken by Sunwater was deemed prudent by Sunwater. The main Palmtree Creek Pipeline had experienced a number of problems with the regulating valve potentially causing a water hammer scenario in the pipeline. This could lead to rupture of the pipeline causing a number of safety and environmental issues. The scope of works is detailed as investigation, procurement and installation of a suitable regulating valve. The level of documentation is of a low to medium quality. The consequence of the inoperability and the risks of continued operation without the valve being inoperable are not clear.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	×

Capital expenditure claim	$955,558
Impact of findings on claim	$90,658
Total Accepted	$864,900

Background

Teemburra Dam supplies raw water to customers along Pioneer Valley and water from Saddle Dam Number 2 is transported by the main Palmtree Creek pipeline, supplying Palmtree Creek. The Palmtree Creek pipeline has a second offtake towards the end of the pipeline which suppliers to irrigation farmers via a series of pressure reducing valves. The main pipeline has experienced a number of problems and catastrophic failures. In 1996, as part of the construction of the Teemburra Dam, [redacted] supplied the original regulating valve that suffered a number of issues before failing in September 2001. In 2007, [redacted] supplied another valve, under the commissioning process in April 2008, and the bronze ported body had failed. This was replaced in November 2008 by a redesigned and strengthened ported body. The bursting disc that relieves high pressure associated with the valve had burst. High levels of vibration due to high velocities within the chamber were noted. These discs were replaced and subsequently burst again. It was identified that due to the level of vibration, metal fatigue could cause the valve to fail closed and lead to a water hammer scenario in the pipeline. This was modelled and determined to potentially cause rupture leading to safety and environmental issues. As an interim measure, the old pepper pot type dissipater was re-installed with no internals until a final solution was implemented.

Options Assessment

An Options Analysis was conducted by Sunwater in July 2009. The report refers to another report titled 'Palmtree Pipeline Dissipater Valve – Waterhammer Investigation for Alternatives to Rupture Discs', which helped influence the options considered. In total, 12 different options were presented and their advantages and disadvantages were assessed. Three options were shortlisted including:

- Option 3.11 – Line with DN600 globe valve and break pressure tank, with smaller fixed flow orifice line branching off it;
- Option3.12 – Single DN600 globe valve and break pressure tank;
- Option 3.9 – Install reducing station with 5 parallel globe valves and break pressure tank and remove Glenfield valve.

The study recommended Option 3.9 as the preferred option due to its range of flow control, no sudden valve closure causing waterhammer, eliminates the Glenfield valve, 5 parallel valves mitigate line blockage, and the likelihood of the relocated guard valve causing disaster is infinitesimal.

In the recommendation, one last additional option was presented. This involved a modified pepperpot design with bolt-on outlet spools that cater for different flow requirements. This would require manual changeout of the spool to change flow rates. Each changeout would require a minimum of three days, but this was considered acceptable as only eight flow changes per year would be required.

Two peer reviews were conducted – one, by [redacted] in April 2010, on the waterhammer analysis, the other, by [redacted] in August 2010, on the valve and system selection. The [redacted] report concluded that the DN600 globe valves would be pushing the limits of their technology and shouldn't be pursued. Instead, they recommended an end of line valve option such as a Bailey polyjet, a redesigned Glenfield valve, or the existing pepperpot with limited flow range adjustment. The preferred option, should Sunwater accept a manual solution, is the pepperpot. It was the least cost option.

Implementation

The project showed actual costs of $955,558 spent from July 2011 to project completion in 2013. It was noted that the project had actually commenced in 2007 as part of the previous price path period, but the financial and procurement details provided are relevant to the current price path period (July 2012 onward).

The project scoping document budgeted $769,950 for the work. This included $489,000 for the supply and installation of the vales and piping. The quotes received totalled $348,956 from [redacted] and [redacted]. $28,129 was quoted by [redacted] for the water hammer review. The actual expenditure was $394,918, which represents a difference of $17,833. This may be attributed to the cost of the [redacted], whose quote or cost was not provided. There is no information documenting contractor variations but based on the final contractor costs, from the Total Actual Cost report, any variation would likely have been minor.

Competitive tendering was used for the butterfly valve, but only one bid was received. The pepperpot was later sole sourced to the same supplier [redacted]. Early engagement of other valve suppliers may have led to more interest in the project, and a more competitive price may have been received. That said, the [redacted] quote was in line with the budgeted amount.

The pipe modifications were granted a procurement exemption to sole source the work to [redacted] based on urgency. The urgency in the project has not been proven, therefore the need for the exemption is uncertain. That said, the cost was $39,770 so a competitive bid would have had a minor impact on total project costs.

The total actual expenditure was $955,558 was made over FY12 and FY13, which represents an overrun on the project of $185,607. This can be attributed to non-direct Sunwater costs. The Sunwater labour had an overrun of $80,417 beyond the budget. The actuals report also had a line item for Prior Year Expenses of $10,241 which should be excluded. The total non-direct costs appear to be 53% of the total project costs, which is considered high. No supporting documentation was included to justify project overruns; therefore, it is expected that Sunwater would recoup some of the costs. The indirect and OH appears to be high too, but as this is managed through SAP, it is assumed as acceptable.

Findings

- Prudency:

  This project is deemed to be prudent; however there is a lack of detail in documentation provided, specifically a business case, prioritisation process, project management reports, and a more detailed construction report. The project scope states that the design will conform to Australian standards.

- Efficiency:

  In the best case, there is a whole suite of documents which describe the robust project management processes, detail contractor variations, and any changes to scope that affect both contractor and internal labour costs. These were omitted from the submitted documents. The valve replacement evidently had substantial technical challenges and resulted in a cost creep, primarily from Sunwater labour and indirect costs. Procurement processes were not effective to gain appropriate market conditions for material supply and installation. Expenses from previous years were also included which should not be part of this claim. For these reasons, the project was not considered efficient and a minimum of $90,658 should be deducted.

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11ETO06 – Brightley Pstn 1 & 2

Project Overview

Brightly PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightly PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightly PS 1 & 2 were noted as being 30 years old and in poor condition. The typical serviceable life of electrical infrastructure is 15 years.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$968,264
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$968,264

Background

Brightley PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightley PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightley PS 1 & 2 were noted as being 30 years old, in poor condition, and non-compliant with current Australian Standards. The typical serviceable life of electrical infrastructure is 15 years. The project is to replace the switchboards at Brightley PS 1 and 2 with switchboards complying with current Australian Standards. This project will also capture improvements in the control system by replacing the superseded relay control with Sunwater's standard specifications and current practices. Furthermore, it will enhance operator safety and improve Sunwater's ability to monitor the PSs remotely. Sunwater have a regulatory responsibility under the Eton Distribution Scheme and would be at risk of not meeting the agreed level of service should the pump stations fail as a result of obsolete switchboards.

Options Assessment

There was no documentation of an options analysis completed for this project. However, the recommended action per the Sunwater: Audit of Electrical Sites suggests the only viable option was replacement of the switchboards. At a minimum, an options analysis should have been completed to consider the consequences of doing nothing, as well as the type of switchboard to be installed (Sunwater standard or otherwise).

Implementation

Cost estimates and actual expenditure went through several iterations. The Cost Estimate 2011 November spreadsheet estimated the combined replacement cost for PS 1 & 2 as $550,189.

In April 2012, the switchboard replacements for Brightley PS 1 & 2 underwent a competitive procurement process, which was also scoped to include switchboards at two other locations unrelated to the project (Cania Dam and Theodore PS). Three suppliers were invited to tender and two offers were received. The contract was awarded to [redacted] The cost for PS 1 and PS 2 switchboards were $367,817 and $335,699 respectively, excluding contingency and GST. The total budget was $703,516. Adding 10% contingency and GST, the budget was therefore $852,464. The contractor’s fee was representative of market conditions at the time and are justified.

The Prudency & Efficiency 2012 July document shows a new project contractor cost of $755,718 to account for contractor variations to increase the radio mast heights. These variations included $46,365.80 for pole supply and install, and $4,480 for soil testing/footing redesign, both excluding GST. The document lists various other variations but it is unclear whether they apply to the Brightley

PS or the Cania/Theodore locations. The final contractor costs reported in the Total Actual Summary are $756,868, which indicates the works were delivered as quoted (or close to).

The Prudency & Efficiency 2012 July document describes a disorganized execution and budgeting of the works over the three financial years. It also states the original budget (in the [redacted] audit) only included switchboard costs, none of the associated equipment, design, supply and installation costs. The document also states that significant expenditure was incurred early in the project prior to construction as a result of indirect costs, procurement and legal. It recommended a maximum of 10% for indirect costs for a project of this type.

The switchboards and controls were commissioned in December 2012. A 2014 Prudency and Efficiency document shows a small increase of $3,274 after construction had completed. This was for uploading CAD files.

A summary of expenditure, as provided in the Total Actual Costs document, shows the total cost for Contractors – Construction & Minor Works was within the budgeted contracted amount. The total non-direct costs were 27% of the total project costs, representing a reasonable expenditure. The indirect and overhead costs were 18%. Despite no information on what percentage the overhead contributes in the 18%, it is assumed the indirect portion would be close to the 10% figure recommended in the Prudency & Efficiency document.

The total final project cost was $1,037,850 with $968,264 being spent in FY12-FY14. Despite being higher than the original budgets, it appears this project was delivered efficiently as a whole.

Findings

- Prudency:

  The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Eton River Water Supply Scheme.

- Efficiency:

  This project lacked documentation in several key areas that would have justified the replacement works undertaken and the funds that were exhausted. The original budget was under-scoped and underestimated and was not an accurate representation of the final funds spent. Alternatives were not formally assessed. Overall, the quality of documentation is low and did not demonstrate appropriate project management processes were followed. That said, the contractor was competitively bid and matched market conditions. It comprised the majority of the project costs. Final non-direct costs (27%) were lower than typical Sunwater projects. For these reasons, the final project costs appear to be efficient.

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12LFZ12 – Eden Bann Weir

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. As a function of time, the control system which operates the fishlock at Eden Bann Weir has become obsolete. To reduce operational risks, Sunwater seek to upgrade the system.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$139,241
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$139,241

Background

The control system at Eden Bann Weir has become obsolete due to its age. The original programmable logic controller (PLC) and SCADA units were built and installed in 1999. This is in-line with Sunwater's standard serviceable life of electrical equipment generally being between 10-15 years. Several components critical to the control system have been identified as no longer supported by the manufacturer. These obsolete parts relate to Sunwater's compliance obligation of operating the control system and fishway under The Waterway Barrier Works Development Approvals (Fish Habitat Management Operational Policy FHMOP 008). This justifies the upgrade of the control system.

Options Assessment

Three options are considered in this analysis:

- Option 1: Replace the control system with Sunwater Standard PLC Hardware (Schneider);
- Option 2: Replace the control system with Non Sunwater Standard PLC Hardware (Allen Bradley);
- Option 3: Do nothing.

The conclusion for this option analysis is a recommendation to select Option 1 because this offers the highest benefit at the lowest cost. Running the fishlock manually was considered but dismissed due to prohibitive labour costs ($0.5M p.a.).

Implementation

A capital expenditure claim of $139,241 was made to QCA.

The September 2013 Project Scope document estimated $35,341 to undertake a site visit, prepare the options analysis, and prepare design and drawings.

The Options Analysis was completed in December 2013 and the preferred option, Option 1, was estimated at $146,208. Option 1 was chosen based on cost and integration with other PLC software used by Sunwater.

Despite the Options Analysis stating the assets would be procured following Sunwater's Standard Purchasing Policy, due to the urgency of the project, an exemption from the competitive offering process form was approved. An invitation to offer extended to [redacted] for the PLC and SCADA upgrade. The offer was received in September 2014. In March 2014 the contract was awarded to [redacted] for $88,796.24 (ex. GST). A budget of $97,676 was allocated to include a 10% contingency.

No cost breakdown of final actual costs was provided; however, the Project Closure Report states the work was completed in March 2015 and the asset cost reported at $88,796.24; therefore, it is assumed there were no contractor variations. It can then be concluded the non-direct costs for the project were 36% of the total project costs, which can be considered low compared to other Sunwater projects. The project was also delivered for less than what was estimated in the Options Analysis. The project cost is therefore deemed efficient.

Findings

- Prudency:

  The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade; it is an essential renewal required to maintain a service and forms part of Sunwater's regulatory compliance. As the control system was identified as being obsolete at time of inspection, immediate works are justified. The assessment of the equipment age was in line with industry standards for life expectancy. Project prudency was effectively demonstrated, as failure to operate the fish lock due to obsolete controls would be a breach of Sunwater's regulatory requirements.

- Efficiency:

  As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed; however, the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Although the information provided was generally high quality, there was a lack of information regarding incurred project costs. That said, the overall cost generally aligns with the scope of works that is described, was under the original budget, appeared to have no contractor variations, and had low non-direct cost. For these reasons, the project cost can be considered efficient.

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Mareeba Supply (BW-MBM)

12MDA57 - Tinaroo Dam Gallery Light Replacement

Project Overview

Replacement of the lighting system within the gallery of the Tinaroo Falls Dam (TFD) was deemed as essential by Sunwater for a number of reasons. An inspection carried out on the lighting system documented it to be in poor condition, Chryotile Asbestos was found to be present in the light gasket material and the system's electrical layout did not comply with current standards. The scope of the project was to replace the gallery electrical system in full and also separate the emergency lighting so that it was on an independent circuit.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$480,001
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$480,001

Background

In September 2014, a team consisting of five Sunwater employees and electrical sub-contractors inspected the electrical equipment at Tinaroo Dam to determine the condition of the assets, assess their compliance to Australian Standards, and to identify any other opportunities for improvement.

The inspection identified issues which presented health and safety risks to personnel entering the gallery of the TFD, including:

- The lighting system was found to be in an overall poor condition. Sub-contractor's observations noted deterioration of cables, wiring and junction boxes, excessive corrosion, ingress of moisture, and use of an incorrect power source for emergency/exit lighting;
- Electrical tests demonstrated low insulation resistance, suggesting a high risk of failure of emergency/exit lighting in a power outage scenario, and lighting gaskets were found to contain asbestos and therefore present a health risk;
- The vast majority of assets that make up the lighting system were determined as having reached end of life according to current industry standards [1].

The team recommended that the issues be addressed as soon as reasonably possible.

Options Assessment

Sunwater considered several potential options to deal with issues observed on the TFD gallery lighting/electrical systems:

1. Engagement of a contractor to replace the distribution boards only, and replacement of faulty bulbs under the maintenance budget;
2. Engagement of a contractor for full replacement of the electrical system and separation of emergency lights to an independent circuit;
3. 'Do nothing'.

The 'do nothing' option was immediately ruled out by Sunwater because the risk of workplace injury had been determined to be high. Option 2 was more expensive than option 1 but was selected as the preferred option because it would significantly lower the risk of injury to personnel through electrical fault or inhalation of asbestos[2].

[1] Tinaroo Falls Dam , Electrical Conditions Assessment 2014.
[2] Renewals Detailed Options Analysis, Mareeba – Dimbulah Water Supply Area, 18 March 2015.

Implementation

Over the course of the next 3 years Sunwater revised the project scope several times. The initial scope included removal of asbestos lighting gaskets and replacement of lighting systems, and this evolved to include replacement of lighting, cables, power distribution boards, junction boxes and power outlets, and separation of emergency lighting to an independent circuit.

Sunwater's initial cost estimate was $10,324 and this was revised to $155,782 in February 2015 after increasing the scope to factor in all required works. In January 2016 an "Offer Recommendation Report" was compiled by Sunwater referring to two tender offers, both of which were significantly higher than Sunwater's estimate. This cost increase was attributed to the increased quantity of light fittings required to satisfy the Minimum Illuminance Australian Standard (AS1680) and the requirement for upstream distribution modelling and verification (originally omitted at the scoping/budgeting stage of the project). Sunwater selected the bid that offered the best value for money ($248,182) and increased their total cost provision for the works to $396,495 in February 2016, noting that the quotes received necessitated an increase in budget to complete the project.

In October 2016, the cost estimate was revised again to $447,564 citing an additional requirement for final inspections and close-out in FY17. In July 2016 this cost estimate was revised again to $480,564 (an additional $33,000). Sunwater later (in an email dated May 20, 2019) clarified mistakes in the Prudency & Efficiency documents, correcting the October 2015 cost revision to $403,089 (from $447,564). The July 2016 revision was corrected to $436,089 (from $480,564). The May 2017 Prudency & Efficiency document (as corrected by Sunwater) had a final revised budget of $479,227 to allow completion of engineering drawings, final documentation, and entry to DIS system. The final capital expenditure claim for this project came to $480,001.

A cost tracking spreadsheet[3] provided by Sunwater laid out the project costs in detail and includes associated project costs dating back as far as FY 2012 (although the documentation provided only dates back to April 2014). The breakdown of costs for this project are as follows: $69,300 in internal Sunwater labour, $140,400 in Sunwater Indirects and Overheads, $252,900 in contractors, construction and minor works expenditure. Sunwater's internal costs (labour, indirects, overheads, materials, travel, etc) represent a 47% of the total project cost which is average for Sunwater electrical projects.

Findings

- Prudency:

  The project is deemed prudent because it seems clear that the asset had reached the end of its life and posed a risk to the health and safety of the personnel entering the TFD gallery.

  The decision to fully replace the electrical system was made based on risk assessment as described in the Renewals Detailed Options Analysis report. The works completed as part of the project were effective in allowing the system to conform to current industry standards. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  The project was delayed (from the initial recommendation) and project expenses were incurred over several years. It is not clear why these delays occurred. The original project cost estimated significantly underestimated the scope of work, particularly the total number of light fittings to meet Australian Standards. Both of the two contractors who quoted on the project had quotes significantly higher than estimated. The preferred contractor was almost $137,000 less than the other bidder, which emphasizes the importance of competitive tenders. The contractor executed the work without variations. The non-direct costs were 48% of the total project costs. While high, this is typical for Sunwater electrical projects. Overall, the project appears to have been delivered efficiently.

[3] 12MDA57 Total Actual Cost Summary

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12NMA08 – Tartrus Weir – Flood Damage Repair – Protection and Erosion Works Refurbishment

Project Overview

Reinstatement of the downstream rock protection associated with the Tartrus Weir was deemed essential by Sunwater for a number of reasons. The significant erosion of the left and right bank abutments, undermining the concrete anchor beam to which rock mattresses are attached. The weir assists in the mitigation of floods in the area and the failure of this asset affects Sunwater's regulatory obligation under the Nogoa Supply Scheme. The scope of the project was to repair the damage to the rock protection to prevent further damage to the asset and scouring of the weir structure.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$229,417
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$229,417

Background

During the 2011 flood, rock protecting the Tartrus weir was damaged and presented safety risks and evidence that this was undermining the weir. Sunwater has classified this asset as "Major" in terms of importance of the asset within the Nogoa Supply Scheme due to its role in preventing floods in the area. Part of the water management protocol is flood mitigation.

Options Assessment

Based on the information available, no options assessment was undertaken. It is likely no other suitable option was available to treat the damages noted in the Annual Inspection Report however a "Do Nothing" or deferring the proposed works should have been considered as part of an options assessment. Repair of the left bank rock mattresses was completed by backfilling rock material and replacing wire lids and rewiring as well as the addition of concrete around the edge of the rock mattresses. The repair of the right bank consisted of reinstating the missing rock protection and protection and stabilisation of the downstream edge of erosion protection. This was completed by the following tasks.

- Placing geofabric over the underlying soil to prevent fine erosion;
- Retrieval of displaced rock and deposited in the stream;
- Trim and profile downstream exposed edge of right bank erosion protection, install geofabric and import rockfill to restore bank profile;
- Remove trees growing through rock protection and all within 6 m of weir structure.

Implementation

The QCA A10 Historical Renewals spreadsheet states a total capital expenditure of $229,417 was spread over three years. $15,949, $191,213 and $22,255 was spent in FY13, FY14 and FY15 respectively.

An initial budget of $156,689 was estimated by Sunwater. Sunwater's initial cost estimate for remedial works during the Preliminary Business Case in October 2011 was $254,811, including a 20% contingency. A revised cost estimate of $225,090 was calculated, including a 15% contingency (2013).

In April 2013, the project scope broke down a total estimated cost of $176,636 into $72,000 for contractors, $32,366 for internal labour, $37,713 for internal overheads, $31,977 for service charges and $2,580 for travel and accommodation.

An offer for protection works was awarded to [redacted] trading as [redacted] for $49,650 in March 2014 (after a competitive procurement process). Supply of rock from Montrose Mining (on a sole source basis due to proximity) was $55,000.

The prudency and efficiency form indicates that there was an increase in the financial budget for increased rock and concrete materials and install during construction, from $173,023 to $191,000 (July 2014). These costs match with the initial project scope cost of $176,636 and the QCA FY14 spend of $191,213. There is little evidence on the expenditure for the Tartrus Weir remediation works in FY13 and FY15, which totals $38,417. It is assumed this is attributed to internal Sunwater costs as indirect costs.

Findings

- Prudency:

  This project is deemed prudent as it posed a flood mitigation risk to the Nogoa Supply Scheme. Loss of flood mitigation would detrimentally affect Sunwater's ability to meet service level agreements with customers. The treatment was suitable to restoring the existing infrastructure. The scope of works defined was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  The contractor/supplier portion of the expenditure (quoted at $104,650) can be considered efficient as appropriate procurement methods were applied and quotes were within the range of the various cost estimates for direct costs. Approval for an increase in the budget to the supply and install of additional rock was well documented. As there was no breakdown of final project expenditure, no additional conclusions can be made on the remaining cost components. The total expenditure of $229,417 is below the business case cost estimate and revised cost estimates, therefore the project costs are assumed efficient but document quality is low.

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12SGA24 – Investigation and Works Required at Moolabah

Project Overview

The emergency works of the Moolabah Weir was deemed as essential by Sunwater for a number of reasons. The condition assessment provided evidence and justification that the repairs were required. The apron slabs of the weir had been lifted in various places, the clay embankment within the structure of the weir and left abutment was eroded, and several instances of advanced piping resulting in loss of storage through the weir. The weir is a regulating structure for releases from Beardmore Dam and forms a pumping pool for a number of upstream regulators. The failure of the weir presents issues in Sunwater's Water Management protocol. The scope of the project was to repair the damages described prior to the upcoming wet season.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$639,046
			Standard	✓	Impact of findings on claim	$40,099
			Cost	×	Total Accepted	$598,947

Background

During the 2012 floods, the Moolabah weir suffered damage and experienced its flood of record with a peak flow of 7,400 ML. Piping of embankment in three locations resulted in undermining of the crest and face slabs allowing some of the storage to be lost. Interim repairs were carried out to ensure the safety of the structure. The weir is a regulating structure for releases from Beardmore Dam and would present issue in Sunwater's water management protocol if repairs were not undertaken.

Options Assessment

Sunwater considered several potential options to deal with issues for the Moolabah Weir and are listed below.

1. Replace weir with similar structure, an embankment protected with crest and face slabs of reinforced concrete;
2. Replace the weir with a steel sheet piling structure;
3. Decommission the weir and raise Beardmore Dam FSL to compensate for loss of storage;
4. Extend the interim repair work to secure the whole structure.

Option 3 involved the decommissioning of the weir, however this would not resolve the flood risk and would ultimately require works upstream at Beardmore Dam. Option 2 was the most expensive option, almost three times the cost of the chosen option. Option 1 was identified as the alternate solution should the dam break study find that there is population at risk. Option 4 was identified as the preferred treatment and was the least cost of the identified solutions.

Implementation

Sunwater's initial cost estimate (April 2011) for direct and indirect costs of the project was $207,732. The final report for the Moolabah Weir Upgrade (June 2012) details the options assessment and selected Option 4 as the preferred treatment at an estimated cost of $530,600. In May 2013, there was a revised cost estimate for Option 4 totalling $430,351 but this did not include the dam break analysis and is therefore not relevant. Sunwater was approved for exemption from competitive pricing for the various contractors. Many suppliers were sole sourced and short-form Offer Recommendation Reports were generated. Details of the contractors, their quotes, and procurement issues are shown in Table 1.

Table 1 Procurement Summary

Offer Recommendation Report	Contractor	Notes	Quote (exc. GST)	Approved Budget (inc. 10% contingency, exc. GST)
Plant Hire	[redacted]	Only provided rate sheet	$44,000	$48,400
Concrete Pumping	[redacted]	Only provided rate sheet	$19,640	$21,604
Civil Works	[redacted]	Only provided rate sheet	$87,400	$96,140
Reinforcement	[redacted]	Only scope item with multiple quotes	$14,278	$15,705
Concrete	[redacted]	Unite rates provided verbally	$96,937	$106,188
Concrete Cutting	[redacted]	Firm quote based on quantities	$18,746	$20,620
Excavator Hire	[redacted]	Hourly rate provided verbally	$[redacted]/hr	$ 6,380

A budget overrun of $100,412 was recorded at project completion as per the Budget Overrun Note (May 2014). The report provides a line-by-line comparison for the variances and includes appropriate justification for the overruns. The additional costs were attributed to plant hire, concrete cutting/pumping, steel, survey, overheads and miscellaneous items.

It appears that the primary underlying reason for the overrun was improper scoping and errors in the original project cost estimate. Key issues included:

- Original cost estimate had incorrect quantity for concrete pumping;
- Scope was added for a cut-off wall, which affected steel reinforcement and concrete quantities;
- Larger than expected void spaces, which affected concrete quantities;
- Unaccounted for safety hazard for crest slab removals, which affected concrete cutting cost;
- Break-up and removal of waste concrete was not originally scoped;
- More difficult terrain led to 180 additional hours for dam break analysis (Sunwater labour).

That said, the procurement process may also have affected overruns. There were no scoping documents generated. Quoting was generally done by asking contractors for hourly or unit rates (by phone or email). Note that the concrete supply (+$36,393) can be justified as [redacted] is the only local supplier.

The determined overspend that should be absorbed by Sunwater has been calculated as $32,054, comprised of the overrun beyond the budgeted amount (plus contingency) on concrete cutting and the dam break analysis. Had the work been appropriately scoped, including a site investigation, the work would have been more efficiently executed. Other overruns due to additional quantities required due to uncontrollable circumstances were appropriately documented and justified. They have been accepted.

In the ‘QCA Information Request A10’ and ‘Project 12SGA24 Total Actual Costs Summary’, the total expenditure cost has been documented as $639,046 and differs from the Budget Overrun Note (May 2014) quoting a total expenditure cost of $631,001. The line items in the Total Actual Costs Summary and Budget Overrun Note do not correspond and it is not clear where costs have changed. As such, the difference between the final capital expenditure cost $8,045 is allocated as unjustified overspend that should be absorbed by Sunwater.

Table 2 Impact of findings on claim

Overspend Identified	Comment
$32,054	Poor scoping of works, resulting in lack of firm contractor pricing
$8,045	Inconsistency between Budget Overrun Note and Total Actual Costs Summary

Total overspend identified: $40,099

Findings

- Prudency:

  This project is deemed prudent as it posed a flood risk and other services and assets were reliant on the operation of the weir. Loss of the weir would affect Sunwater's ability to service upstream regulators. The treatment was suitable to restoring the existing infrastructure. The scope of works defined was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  There were several inefficiencies observed in this project. Original budget estimations were loosely based on Project Manager experience from previous repair works. There were also errors in the quantities and rates. Cost estimation for material supply and plant hire could have been improved if a competitive purchasing process was adopted. All but one supplier / contractor were sole sourced with no clear scope, so a clear representation of market conditions could not be determined. Poor scoping and budgeting combined with exemptions from the competitive purchasing process resulted in the budget being overrun by 19%. Some of the deviations from the original budget could have been prevented by following the standard procurement process. Therefore, budget overruns should partially be absorbed by Sunwater. Furthermore, the quality of verifications of the quantities in BoQ should be improved to prevent large variances in the actual cost. It is noticed that some of the similar services were awarded to different suppliers. Had service be packaged to a single supplier, Sunwater would have more negotiation power. Furthermore, internal costs for contractor management should decrease. The proposed adjustment of $32,054 is based on the overruns for the dam break analysis and concrete cutting beyond the budgeted amount and contingency. For these tasks, had appropriate scoping and site inspection occurred, the work would have been conducted more effectively. Other overruns due to incorrect quantities and uncontrollable site conditions have been appropriately documented and are accepted. Lastly, the total cost from the Budget Overrun document omitted $8,045 in project overrun. Without justification, this has been considered inefficient and added to the adjustment total. The total is $40,099.

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13BIA48 – FD01 (2013) Flood Damage Repairs - Don Beattie PSTN

Project Overview

The repairs to the Don Beattie pump station and rising main, as a result of the 2013 floods, was deemed prudent by Sunwater. The damages included scouring of the embankment, which supported the rising main, as well as other damage to civil, mechanical, and electrical components. The pump station is critical to the Bundaberg Distribution Scheme. The scope of works involved damage inspection, options assessment, procurement and construction of the repairs. The level of documentation for efficiency is of a low quality. A consolidated budget and scope of all works for this project is not available. The total actual costs are much higher than the various budgets stated. It is also unclear why the project construction was delayed 4 years after the March 2013 damages occurred.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim	$1,272,616
Impact of findings on claim	$0
Total Accepted	$1,272,616

Background

The Don Beattie Pump Station (PS) forms a crucial part of the Bundaberg Distribution Scheme. Multiple damages were reported as a result of the 2013 flooding of Burnett River. One of the most critical was scouring of the embankment, which previously provided support and protection to the rising main at Don Beattie PS. Without the embankment, vibration of the pipe and permanent supports have been reported. The vibration has caused some spalling of the supporting concrete. Other damages include loss of the pump station's access road, site drainage, deposition of debris and silt into the pump intake structure, significant scouring around the intake structure, deposition of debris around the pump well base, damage to the septic tank installation, damage to stormwater pipe, damage to pump well sump pump and discharge pipework, and damage to cathodic and lightning protection system.

Options Assessment

The extent of the flood damage was investigated and scoped starting in 2013. It included a geotechnical investigation, a deformation survey, and a stope stability assessment. Various scoping documents were generated for different aspects of the project. A February 2016 report detailing the options analysis shows four options were considered:

- Option 1: Do nothing;
- Option 2: Replace 'like for like';
- Option 3: Concrete encase the rising main pipe;
- Option 4: Denso wrap coating the rising main pipe then fill with free drain material and cap with concrete rockfill.

The preferred option was Option 4, which was stated to achieve the least financial costs, maintain standards, and minimise risks. The pipe would be protected from future flood events.

Implementation

A QCA expenditure claim of $1,272,616 was made over FY13 through to FY17 with the bulk of the costs and the construction occurring in FY17. There is generally a low quality of documentation with the project being planned, scoped and costed in piecemeal fashion. Table 1 shows the progression of the cost estimates and associated scope.

Table 1 Documented Budget Revisions

Date	Budget	Scope
February 2013	$209,292	Isis Pump Station Intake Structure - Desilting of Intake Structure and Pump Intake Pipes. Construction of Access to Intake Structure on separate Doc #
February 2013	$204,849	Reinstate Eroded Bank Section, CP Anodes Lightning Protection Septic Installation at base of Pumpwell Bank Side, Sump Pump Discharge Pipework
February 2013	$204,339	Reinstate Eroded Bank Section, CP Anodes Lightning Protection Septic Installation at base of Pumpwell Bank Side, Sump Pump Discharge Pipework
March 2013	$658,000	Reinstate access road, de-silting intake structure, pump well base works, deformation survey Cathodic protection is excluded
July 2015	$351,077	Clean pump well, replace fill at base of well, rising main repairs, cathodic protection, remove existing facility, new toilet, sump pump discharge pipework, light protection, rainwater pipe works, catch drains, internal costs
May 2016	$392,143	Option 4: Mob/demob, supply/place fill, supply/place rock, supply/place concrete, denso wrap, indirect costs
June 2016	$564,300	Mob/demob, project/construction management, pipeline corrosion protection, supply/install free draining backfill, supply/place rockfill and concrete, supply/install stormwater pipework, supply/install sewerage holding tank, supply/install rainwater tank concrete
September 2016	$898,369	Approval request to increase Feb 2016 approved budget from $498,369 (exc contingency) to $898,369 for FY17 to account for higher bid price than estimated.
December 2016	$898,369	Approved budget for $898,369 including rising main protection and repair, cathodic protection, new toilet, sump pump discharge pipework, lightning protection, rainwater piping, catch drains Road repairs added to scope

A November 2014 report, *Summary of Works 2013 prior to second peak flood*, states that $146,941 was spent prior to the March 2013 flood in constructing the temporary road and inspecting and removing silt and debris from the intake as a result of the January 2013 flood. The costs of these emergent works can be considered acceptable due to the urgency.

The second flood occurred in March 2013. It is assumed that the damage from the second flood had a smaller impact to operation of the pump station, since there is no record of any emergent work and no further construction until FY17. It is assumed the FY14-FY16 expenditure is related to investigation, planning and design of the FY17 works.

Procurement documents available show a competitive procurement process with six offers received and a contract awarded to [redacted] for the construction of the Don Beattie Pump Station Rising Main and Bridge Pier Works for $694,761 ($798,975 with 15% contingency).

While appropriate procurement methods were used to obtain a satisfactory market value for the works, the project was originally significantly underestimated in value with a budget of only $498,369 (although no record of this budget exists among the documentation). The budget was revised to $898,369 and the FY17 works were delivered under budget for $880,058. The construction contractor component was only $3,000 above their quote of $694,761. This indicates that the FY17 were efficiently delivered.

Findings

- Prudency:

  Sunwater have a responsibility to supply water under the Bundaberg Distribution Scheme. The damages reported as a result of the 2013 flood have directly affected Sunwater's ability to access, operate and maintain Don Beattie PS. As such, this puts Sunwater at risk of not providing the agreed level of service to its customers. There is also a safety risk associated with the existing condition of the site, should site personnel try to access it without remediation works.

- Efficiency:

  Based on the documentation provided, there was clear consideration for the best means of repairing the damages at Don Beattie PS. The appropriate processes were followed in terms of defining project scope, consideration of capital and operational expenditure, options analysis and procurement of works. The construction works in FY17 were carried out effectively; however the reason for delay in the start of construction from the 2013 flood is unclear. The planning and design phase was not appropriately defined or budgeted, which may have led to the delay. That said, the overall project non-direct costs were 32% and in line with typical Sunwater projects.

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13LFZ07 – Eden Bann Weir

Project Overview

A significant amount of debris, gravel and silt was deposited within the fishlock chamber and discharge channel at Eden Bann Weir during the flood event in March 2012. The presence of the deposits/debris in the fishlock chamber caused the fishlock to become inoperable. Most of the metalwork items at the weir have also lost their galvanised coatings through abrasion and are experiencing minor to substantial corrosion.

The project's scope is to restore the fishlock to a fully functional state, to clean the fishlock discharge channel downstream of the weir wall, and to repair, replace, and re-galvanise the corroded metalwork.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim	$493,849
Impact of findings on claim	$0
Total Accepted	$493,849

Background

Eden Bann Weir is located approximately 62 km north west of Rockhampton on the Fitzroy River. It was constructed to supply water to Stanwell Power Station. A flood event in March 2013 filled the fishlock chamber with deposits and debris causing the fishlock to be inoperable, as well as damaging the metalwork throughout the weir.

Although not documented, it is known from previous project 13DVA06 that operation of fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008.

To repair the weir, the fishlock system will need to be desilted, refurbished and repaired where necessary. The metalwork will also need to be replaced, reinstalled and re-galvanised where necessary in the weir.

Options Assessment

Although a Flood Damage Inspection Report was completed along with a Project Scope Definition Report, there was no options analysis completed for the project. The "Do Nothing" option was not detailed, although the evidence of an inoperable system was described. This also includes a lack of information to determine if the works conform to an industry standard.

The scope described are consistent with the general existing infrastructure, i.e. like for like repairs.

Implementation

The Flood Damage Inspection Report completed formed the basis for the justification for this project. After damage to the weir was noted, a Project Scope Definition Report was developed to present a scope of work for the repair of the fishlock and metalwork.

Whilst an options analysis was not completed, the works were completed. Inconsistencies in the process were noted due to the lack of documentation in defining the project management tasks throughout the project, with several documents being missing.

The QCA A10 Historical Renewal spreadsheet outlines capital expenditure claims of $2,076, $11,808 and $479,966 in FY13, FY14 and FY15 respectively. The claim total is $493,849.

A budget board paper in July 2013 stated that there was a revised budget for the project of $100,408. By May 2014, an Eden Bann Repair Fishway Project Estimate spreadsheet indicated a cost estimate of $619,090. This figure was then updated, stating an approved budget of $681,874, inclusive of a 10% contingency.

From the procurement documents available, an offer was awarded to [redacted] in March 2014 for works of $70,000 (ex. GST, incl. 15% contingency) for debris removal. Two offers were sought but only one received.

A form for exemption from competitive procurement shows an offer was awarded to [redacted] for hydraulics works totalling $83,000 (ex. GST) in March 2014. The grounds for exemption was on genuine urgency but also stated that [redacted] was successful on a separate Sunwater project that was competitively bid and the same rates were being used. Furthermore, they were original designers and suppliers of the equipment so efficiencies in design should be realised.

Three (3) contractors put in offers for mechanical services and were evaluated on cost efficiency. [redacted] was chosen on relevant works history and safety grounds. An offer was awarded to [redacted] in March 2014 totalling $300,000 (ex. GST, incl. 50% contingency). The high contingency was used because the scope of work could not be identified until debris had been removed.

A history record notification states that work for like-for-like repairs was completed in June 2015. There is no report on actual expenditure breakdown but the total expenditure is less than the revised cost estimate of $619,624 (exc. Contingency).

Findings

- Prudency:

  Whilst the project had sufficient documentation with respect to the damage occurred from the flood in the Flood Definition Report, the detail around the statement of regulatory requirement for the fishlock's operation was not included. AECOM understands that fishway operation is a regulatory requirement, therefore the project has been considered prudent but the level of documentation has been considered low.

- Efficiency:

  This project is deemed as efficient in scope, standard and cost. The total expenditure claim of $493,849 is lower than the approved budget from May 2014. While the contractor procurement process included exemptions, it appears to have been for appropriate reasons. Where multiple bids were received, costs were similar, demonstrating costs match market conditions.

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13NMA04 – Fairbairn Dam - Investigation of Spillway

Project Overview

Voids were detected in the concrete work of Fairbairn Dam. The stability of the spillway apron may be compromised by seepage under the concrete slab. The Fairbairn Dam is major infrastructure in Sunwater's water resource scheme. It is critical that it operates as intended to manage water levels. Definite signs of deterioration have been observed that need to be addressed to restore the structure to design condition.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$731,843
			Standard	✓	Impact of findings on claim	$74,364
			Cost	×	Total Accepted	$657,479

Background

Fairbairn Dam is an earthfill-filled embankment dam across the Nogoa River located southwest of Emerald in Central Queensland. The dam was originally constructed between 1969 and 1972 from mass reinforced concrete. The standard life expectancy for concrete is 50 years, so the structure is nearing its serviceable life.

The initial observations of the drummy concrete at a previously established repair site was investigated at the dam and was later determined by Ground Penetrating Radar (GPR) to be voids. Multiple voids outside of the initial investigation area were discovered, particularly in the steep, lower portion of the spillway where coloured seepage was observed. Whilst traverse drains were previously installed, the voids observed indicate these drains are not working as intended. Considering the transverse drains were constructed from earthenware pipes, it is possible these have since failed due to age.

Options Assessment

An options analysis was completed after initial investigations to determine the most effective solution for the repair of the dam spillway. As part of the options development stage, a Technical Review Panel (TRP) was involved to provide comment after Sunwater's recommendation was proposed. The TRP made an alternative recommendation to Sunwater's proposed strategy and recommended that a set of emergency works to be undertaken, including an order of priority.

The options are as below:

1. Sunwater's proposed strategy involved installing 900 No. Passive ground anchors upstream of the Ogee Crest, along the Ogee Crest, and covering the entire 1:10 slope of the spillway;
2. The TRP's proposed strategy involved upgrading the existing drainage system to eliminate the effects of transient pressures on the 2:1 slope section of the spillway. The TRP also recommended general sealing of joints, and extra installations of anchor bars to strengthen and mitigate the possible failure of sections in the spillway.

Option 1 was the initial option proposed by Sunwater but was noted to have little to no effect in preventing a spillway failure if a concrete slab on the 1:2 slope was to fail. Given the scope development and advice from the TRP, a non-capex option was not feasible for this project due to the risk of failure of the spillway structure. Option 2 was selected as the preferred option.

Implementation

The initial observations and subsequent thorough investigations of the concrete structure at the dam formed the basis for the justification for this project. A formal technical review process was then completed and determined that the spillway's stability was potentially compromised as a result of the seepage observed. Once the scope of works was determined, it was deemed critical to commence the works as soon as possible to prevent further damage and manage risk of catastrophic failure of the spillway.

The original budget estimate of $36,591 was determined in April 2012 in the scoping document. The scope of works was expanded in 2014, however the cost estimate within the scoping document was not updated.

In July 2014, an Offer Recommendation Report was compiled by Sunwater referring to the two tender offers received. [redacted] provided two offers, $60,300 and an alternate option costing $73,490. [redacted] provided an offer amount of $120,519. Sunwater selected [redacted] as the bid that offered the best value for money ($73,490). An expenditure of $81,000 excluding GST was approved.

A budget increase was required in April 2015 as per the Memo detailing the project update and request for project funding. The budget was $285,579 as per the document. The project costs up to FY 14/15 has been recorded at $359,943, an overspend of $74,364. The overspend (26%) is slightly outside the cost estimate accuracy bounds (20%). Furthermore, the cost breakdown of the initial overspend or any justification were not provided by Sunwater; therefore, it is assumed the overspend was due to inefficiency of work as opposed to a valid change in scope.

Additional funds were requested to cover the overspend and further works proposed. An additional $404,500 was required to fund further investigations and the options assessment. The appropriate cost breakdown is provided. These increases resulted in a total budget increase of $478,864 and a total budget estimate of $764,443.

The prudency and efficiency document (May 2015) details the increase from the previous cost estimate to the current cost estimate. The previous cost estimate in July 2014 is $285,579 and the revised cost estimate as per May 2015 is $642,000, an increase of $356,421. This does not match the cost estimate in the April 2015 memo, and it is unclear how this revised cost estimate aligns with the previously identified scope.

The second phase of funding appears to have been delivered under the requested budget; although no breakdown of actual spend vs budget was provided so no conclusions can be made to the efficiency of how the funds were spent. The total overspend on the initial budget is $74,364 and will be considered inefficient until Sunwater can provide justification for valid increases in scope.

Findings

- Prudency:

  The project is deemed prudent as the significant seepage under the spillway was determined to be undermining the risk of failure. The documentation in relation to justifying the prudency of the project was of high quality and provided a clear technical basis for the dam repairs.

- Efficiency:

  The project is primarily deemed as efficient in scope and in standard. However, the cost of this project was not considered efficient as there is a lack of cost breakdown to justify the overspend of $74,364 against the first phase budget of $285,279. There is also no cost breakdown for the second phase of the project expenditure, but it appears to have been delivered under budget.

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14MAB05 – Coolmunda Dam

Project Overview

Repair of the dam gates at the Coolmunda Dam was deemed essential by Sunwater. The Coolmunda Dam Safety Inspection found that the counterweights used to operate the flood gates were reaching close to the end of their guide within the float well. Should the counterweight rise and catch on the guide, this will jam the gate, potentially damaging the dam, gate and ropes. The operation of the dam gate is critical to Sunwater's requirement to fulfil regulatory obligations as part of their water management protocol. The scope of the project was to retain and protect the functionality of the dam gates prior to the upcoming wet season.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim	$283,434
Impact of findings on claim	$0
Total Accepted	$283,434

Background

In 2008, it was reported that the wheels of the gate system had extended past the guides and it was suspected that it was as a result of steel rope creep. The Coolmunda Dam Safety Inspection in 2013 found that the counterweights, which operate the flood gates at the dam, were getting close to the end of their guide within the float well chamber. Coolmunda Dam operates in a very similar manner to Callide Dam. If the counterweight wheels are below the existing guides, there is a risk that in a flood event when the counterweight rises in the float chamber, it will catch on the guide and jam the gate. This incident previously occurred at Callide Dam, therefore increasing urgency for improved counterweight functionality at Coolmunda.

Options Assessment

Sunwater undertook full options identification and multiple criteria analysis as part of the scoping process. A cost-benefit and risk analysis was completed to the support the assessment.

Part one of the assessment was to determine the degree of refurbishment required.

1. Do Nothing;
2. Full Refurbishment;
3. Carry out rope adjustments.

It was determined that a full refurbishment was required and the following options were considered.

1. Tighten turnkey bolt at top of counterweights to lift gate 100-150mm;
2. Monster Crane – remove floats and perform fix up;
3. Temporary formwork structure over hole to lift float out, place beams under for support and fix;
4. Purchase new ropes and replace;
5. Shorten existing ropes if possible;
6. Put second rope on float and tie off to a beam. Work under the weight with scaffold arrangement;
7. 'Do nothing'.

The 'do nothing' option was disregarded as it was determined not to be in Sunwater's best interest based on the precedent at Callide presenting an unacceptable risk. Based on previous experience, Option 1 may not be effective as previous works in November 2013 using this method showed that the counterweight could only be raised by 45 mm due to debris, thread galling or elongation of the threads. Option 2 and 3 was discounted due to the cost and timing required to implement. Option 3 also involved personnel working under suspended loads and deemed unacceptable to Workplace Health and Safety. The lead time to acquire replacement ropes for options 4 and 5 was seen as an issue and was not a permanent solution. Option 6 was chosen as it provided a permanent solution at a low cost.

Implementation

No original cost estimate was provided by Sunwater, however the Detailed Options Analysis document (Last Revision Sep 2013, New Revision Sept 2015) details the cost breakdown. The cost estimate for Option 6 was $144,820.

This project was exempted from the competitive offering process on grounds that genuine urgency exists as per the State Procurement Policy and Sunwater's Purchasing Policy and Guide. The Procurement Exemption document (Jan 2014) quotes an estimated expenditure of $180,000 (excluding GST) for this project and was not expected to exceed this value.

In February 2014, [redacted], Sunwater's contracted maintainer of cranes, provided a budget estimate price of $78,075 for the scope of works as per the Project Planning Document.

The Prudency and Efficiency Document (n.d.) captures the change in cost estimate from $143,285 at Phase 1 in July 2013 to a revised and current cost estimate of $283,484.00 in March 2014, an increase of $140,226. The justification of change in cost estimate is based on the fact the original $143,285 was allocated without any scope or cost estimate. It was simply the funds available in the NSP for the budget year at that time. The final $283,434 costs were described as prudent due to costs associated with resolving WH&S issues to ensure the project is undertaken in a safe manner. In the demonstration of efficiency section, Sunwater states "The project was completed at no risk for $283,434. The options analysis estimate was close to $2,000,000". There is no mention of any option with an approximate cost of $2,000,000 in the options assessment document provided and has been used to justify the increase in cost estimate. No supporting documents are available for this two million figure.

The January 2014 Construction Report documents a total of 23 work days but does not provide a breakdown of final actual cost expenditure. The contractor quote was $78,075 and identified a 5-day program of works. It appears the contractor quote was underestimated. It is unclear how much of the final project expenditure was attributed to contractor costs but due to the schedule in their quote vs the construction report, it is assumed that their costs are significantly higher than quoted.

The options assessment appears to have estimated 21 work days, which is closer to the actual work days expended. The cost estimate was $144,820 and it was assumed this was estimated based on self-performed work. The lack of and quality of documentation with regards to project planning, project management, and cost reporting as well as the fact the contractor was sole sourced, leads to a risk that the project may not have been performed efficiently. That said, the final expenditure is within the accuracy bounds of the options analysis cost estimate (+100%) and the number of work days projected are close to actual work days. For these reasons, the project cost has been deemed efficient.

Findings

- Prudency:

  This project is deemed prudent due to the failures of the Callide Dam in 2013 and the similarities in issues observed with the rope creep. The risk of a similar failure in Coolmunda Dam is likely and the consequence during a flood event would be catastrophic. The option chosen to repair the gate was effective in protecting the asset from further damage in flood events. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  The project is primarily deemed as efficient in scope and in standard. While the quality of documentation and project management appear to be low, the total actual cost expenditure is within the accuracy bounds of the options analysis cost estimate albeit at the upper end. Furthermore, the biggest consideration for the project was safety and was a key cost driver. The project appears to have been delivered carefully and without incident. For these reasons, combined with the number of construction work days versus what was projected, the project cost has been deemed efficient.

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14MDA13 – Mareeba-Dimbulah Water Supply Scheme

Project Overview

The SCADA control system that services the Mareeba-Dimbulah Water Supply Scheme is obsolete and requires replacement. There are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required. It was concluded to maintain the [redacted] system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants. [redacted] was contracted as a sole supplier. Their quote was higher than expected, therefore part of the program scope was deferred to remain in the allocated budget. The project is ongoing and as a result there is no supporting documentation to show scope completion.

Summary of Findings

Review Summary					
Prudent	✓	Scope	✓	Capital expenditure claim	$876,952
		Standard	✓	Impact of findings on claim	$0
		Cost	✓	Total Accepted	$876,952

Background

The Mareeba-Dimbulah Water Supply Scheme (MDWSS) encompasses the towns of Atherton, Walkamin, Mareeba, Mutchilba and Dimbulah. It provides water for agricultural land and two hydro power stations: Tinaroo Dam and Barron Gorge. The Mareeba Distribution SCADA control system was installed in 1995 to provide automatic and remote control and monitoring of key water control locations in the scheme. The equipment is now 20 years old. The SCADA assets are responsible for regulating gateway control of the system. As the system is obsolete, it is necessary to upgrade to reflect modern technologies.

Options Assessment

Five options were considered as part of a Detailed Options Analysis. These include:

1. Do nothing;
2. Remain with [redacted] system and refurbish, partially replace and recommission;
3. Replace all with [redacted]
4. Replace all with [redacted] based and/or other systems;
5. Partial replace with [redacted] and/or other systems - operate with multiple systems.

The preferred option was determined to be Option 2. As there are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required.

The detailed analysis of these options as above identifies that the best option is to continue with the [redacted] system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants.

Implementation

The budgeting and scoping of the project is not clear. The scope was modified and scoping documents, cost estimates, and project management documents were not revised. The R&E Options Analysis estimated the project at $810,000 in $FY14, comprising $500,000 initially then $100,000 every three years for 15 years. The 2014 cost estimate spreadsheet has multiple tabs with different total costs. It is not clear what they represent. The first sheet (Summary based on Audit) totals $396,720. The next sheet (Mareeba SCADA works list costs) totals $398,400 for the various scope at all 56 sites, then another $684,930 for the 56 sites for annual R&E over five years. The full program totals $1,083,330.

A March 2015 memo proposes a budget of $739,200 across FY15 and FY16, of which $496,100 is earmarked for [redacted]. These include a 10% contingency.

The first Prudency and Efficiency document (2014) identifies the initial cost estimate for replacement of the SCADA control system was $640,339, however this was revised several times with the final June 2016 Prudency and Efficiency document requesting budget approval for $874,770.

The procurement process was generally sole sourced as [redacted] is the sole supplier. In May 2015, $18,900 was awarded to [redacted] for the installation of latest [redacted]. In January 2016, $438,860 (10% contingency to $483,000) was awarded to [redacted] for the SCADA refurbishments. The originally quote (not provided) was above the project budget. [redacted]'s scope was reduced from 49 sites to 18 sites for the FY16 year in order to meet the budget. The remainder of the sites would be deferred to the FY19 and FY20 R&E schedules. Lastly, in January 2016, $25,760 (no contingency proposed) was awarded to [redacted] for concrete works. Two quotes were sought but only one received due to timing of the works.

As documented in the FY15 Prudency & Efficiency, the first cost estimate revision was based on refinements resulting from initial scoping conducted by Sunwater and [redacted]. The estimate was increased from the previous cost estimate of $640,339 to $767,667.

In the subsequent Prudency & Efficiency FY16 document, additional funds of $40k were required for the development of complex tender documents which were previously under estimated. The offer received from [redacted] was critically assessed with costs higher than the budget of the time, partially attributed to low initial estimates and existing RTU's being obsolete. The scope of contract was reduced to the installation of six flume gates and replacement of 12 RTUs to be within the tender budget. Additional works including concrete structure modifications, screening, safety handrailing ($20k) and overheads on the tender ($22k) were not taken into consideration in original estimated. Some of this cost was offset by the contingencies allowance. The revised cost estimate became $826,000.

The third and final cost revision was documented in Prudency & Efficiency FY16 which allowed for $30k for site final fit-outs, engineering sign-offs, asset creations/tidy up and completion. The revised cost become $874,775.

It should be noted that there were discrepancies in the figures provided for previous costs and revised costs from Prudency & Efficiency FY16 June and November documents. The cost estimate for Phase 7, $826,000 (June) was documented as $855,186 (November). It appears as though the latter is the correct figure based on the additional $40k, $20k and $22k documented in the June revision. This is something that should be rectified by Sunwater to ensure accuracy and transparency of cost estimations.

Based on the information supplied in the Prudency & Efficiency documentation, all changes to the project budget could be justified based on scope changes and variations. The total final spend was $876,952, of which there was $18,900 for software and $424,975 for contractors. The software matches the quote and the contractor work by [redacted] and [redacted] appears to be less than quoted. There is no documentation to show what work was completed and whether the contractors fulfilled their scope.

The total non-direct costs on the project make up 45% of the total project costs, which appears high. The Prudency & Efficiency documents state that tendering became more complex than envisioned.

Findings

- Prudency:

  The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the MDWSS.

- Efficiency:

  Based on the information provided, the appropriate processes for effective project management were originally adhered to but were not carried forward through the project. Five options were assessed against an appropriate MCA framework. The preferred option presented the best cost with most benefit as Sunwater was familiar with the [redacted] System currently in place. The project scope, direct costs, and non-direct costs were all underestimated, and the project scope was reduced as a result. Considering [redacted] is a sole supplier, the revised scope appears to be cost efficient; however, this is assuming the contracted scope was completed. Final non-direct costs (45%) are within the average range for Sunwater electrical/controls projects.

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14MDA33 – Copper Sulphate Research Project

Project Overview

This project involves research into the use of copper sulphate to control filamentous algae in irrigation supply channels. Without copper sulphate dosing, algae growth would be uncontrolled and may negatively impact Sunwater's ability to supply water for irrigation purposes to its customers under the Mareeba Dimulah Water Supply Scheme.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$496,996
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$496,996

Background

Sunwater uses Copper Sulphate to control filamentous algae in irrigation supply channels and in January 2003 applied to the Australian Pesticides and Veterinarian Medicines Authority (APVMA) to register copper sulphate as an algaecide for use in irrigation channels to maintain reliability of water supply. The activity is currently carried out under an existing Off-Label Permit previously issued by the Queensland Government for which responsibility was later transferred to APVMA. The permit was set to expire in March 2013 and so the works were required to determine forward management strategies for algae control in Sunwater's open and closed water supply channels, the prepare the regulatory submission.

Options Assessment

An options analysis was not completed as this is a research project. The works undertaken were necessary to proceed with the permit approvals process.

Implementation

A Project Brief was prepared in November 2011 to seek consultant quotes for research into control options for the filamentous algae, and for preparation and submission of the regulatory application to APVMA. There was no documentation to show how the procurement outcome, but the February 2012 Status Update document states that [redacted] was assisting Sunwater in the application. There was no further documentation to show deliverables were completed by this consultant. That said, the expenditure claim for this project starts in FY14. The total actual costs show a total of $29,365 for consultant services with the majority spent in FY18.

The February 2015 memorandum states that the permit expired March 2013 and a 2-year research permit was obtained. This research permit was then extended to March 2017; although the permit itself shows an end date of March 2018. The full application date was targeting December 2015 with hopes of an approved permit by July 2016. The estimated budget for FY16 was $135,000 but no breakdown was provided. The total actual costs show $68,417 was expended in FY16. It is not clear whether the proposed scope was completed.

The Prudency & Efficiency 2015 August document shows a previous 2012 estimate of $304,464.66. It was proposed to increase this to $455,000.00. The justification for this increase was that the original concepts for monitoring did not provide the anticipated results. The application to the APVMA could not be completed until information suitable for the submission was gathered and confirmed.

The Purchase Order Increase 2015 October document recommends an increase of $10,040 excl. GST (from $79,960) to the [redacted] purchase order to allow additional tests to support permit approval. The original offer from 2012 had a value of $67,337 covering FY13, FY14, and FY15. There is no documentation showing an original purchase order of $79,960 for FY16 onward.

The project continued through FY18 and FY19. The Project Request Change 2018 September document requested a budget increase of $8,804 from the original $40,000 budget to facilitate timely turn around in the provision of information required by APVMA for permit approval. There is no documentation showing what the original $40,000 entailed; however, this is unrelated to the FY12-FY18 project sample assessment.

The Project Request Change 2019 February document requested an increase of $19,709 from the original $40,291 budget. The justification for this was similar to the previous request. It is assumed that the September 2018 project request change was not processed, and this February 2019 request supersedes it.

The RFI supporting information spreadsheet stated that $50,000 was estimated to be required in FY20 to work with Queensland Government in developing a Code of Practice to compliment the project's research findings.

The final budget for FY12-FY18 inclusive of requested funds appears to be $455,000 from the Prudency & Efficiency document. The [redacted] purchase order increase has been assumed to have been budgeted for. The Total Actual Costs show a total project expenditure of $436,167 for FY12-FY18. Documentation for scope, budget, and breakdown of costs was low on this project.

Findings

- Prudency:

  This project was initiated to ensure that Sunwater could continue the control of algae in open and closed channels as part of their irrigation supply under the Mareeba Dimbulah Water Supply Scheme. The project was required to obtain an operating permit from APVMA that was due to expire. In 2013, instead of new operating permit, a research 5-year research permit was sought and issued instead. Sunwater engaged a specialist consultant to provide advice on a recommended strategy for progressing its application to APVMA. The consultant assisted Sunwater's environmental team in developing a sound understanding of the technical details of the scheme, monitoring data as well as the proposed treatment approach.

- Efficiency:

  The technical components of this project are in accordance with industry standards. Sunwater demonstrated project efficiency in engaging with APVMA and other federal agencies early on in the permit application process. The project has predominantly been self-performed. A consultant, DT Services, was used for professional guidance and it was unclear whether the services were competitively procured and what their intended scope was, but their total costs was $29,365 thus a small project impact. The overall quality of documentation for establishing scope and budget was low, and as a result it is difficult to assess project efficiency. The final budget appears to have been $455,000 and actual costs were $436,167; therefore, it is assumed as efficient.

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15CVA16 – Review of Dam Operation as Callide Dam

Project Overview

As part of the Inspector-General Emergency Management (IGEM) project initiated by the Queensland Government, the performance of Callide Dam was assessed. The 2015 Callide Creek Flood Review Volume 1: Report determined that a number of recommendations were to be implemented by various agencies that included Sunwater to improve response to future flood events. The project was split into two parts, Phase 1 involved the review of information and Phase 2 was the implementation of the recommendations.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$1,545,858
			Standard	✓	Impact of findings on claim	$135,858
			Cost	×	Total Accepted	$1,410,000

Background

The flood impacts from Tropical Cyclone Marcia instigated a review by the Queensland Government to determine what role, if any, the Callide Dam played in the event. A number of recommendations which were to be implemented by Sunwater were provided.

Options Assessment

No options assessment was undertaken as part of this project as the recommendations were already provided by the outcomes of the Government's Review Report. Stage 1 of the project consisted of preparing a response to the IGEM review and requests for information. The Stage 2 deliverable involved implementing relevant recommendations from IGEM. The recommendations that Sunwater were required to implement are listed below.

- Recommendation 1 – Sunwater undertake necessary studies to determine whether it is feasible to operate Callide Dam as a flood mitigation dam.
- Recommendation 4 – Sunwater to provide downstream residents with easily understood information regarding operation of the dam, and the personal impacts of various outflows.
- Recommendation 5 – Sunwater assist Department of Energy and Water Supply in seeking clarification of dam owners' legal obligation to comply with Emergency Action Plans and if required, investigate how a more flexible approach could be adopted.
- Recommendation 6 – Sunwater jointly identifies the requirements for a suitable gauge network for the Callide Valley to allow meaningful and timely flood warnings. Review should include the identification of key stakeholders, examine potential funding sources and include a cost benefit analysis.
- Recommendation 8 – Sunwater and Banana Shire Council jointly develop a multi-channel, common warning strategy for residents downstream of Sunwater assets prior to September 2015.
- Recommendation 9 – Sunwater and Banana Shire Council ensure Emergency Alert messages are pre-formatted, consistent, polygons are identified according to risk and tested and practiced with the State Disaster Coordination Centre.

Implementation

The costs involved in this project are primarily Sunwater labour costs as this was not a construction project. A number of external services were engaged for the following

- Project Director for Stage 2 Works
- Legal Works
- Hydrology, Flood Reviews and Modelling
- Project & Stakeholder Management

Documents are available for the request for offer (No.15SW4577 27 Jul 2015) for a Project Director for Stage 2 works, but it is unclear whether the other works were procured via a competitive tendering method.

The final expenditure claim was $1,545,858 according to the Project Cost Plan (31 March 2018). The original budget approved for Phase 1 (review works) was $850,000. The actual cost of Phase 1 came under the budget at $835,110. The original budget approved for Phase 2 (implementation) was $560,000 (excluding contingency). Due to budget constraints, the contingency amount of $119,136 was not approved. The Stage 2 works had actual costs of $710,748.

No documents provided by Sunwater explains the $150,748 overrun. From the *Project Cost Plan*, it appears the overage is partially due to two of the contractors ([redacted] and [redacted]) but primarily due to Sunwater staff for Project and Stakeholder Management. The reported line items from the *Project Cost Plan* are shown in Table 1.

Table 1 Stage 2 Budget to Actual Variance by WBS

WBS Description	Budget ($)	Actual ($)	Variance ($)
Hydrology & Flood Ops - Review (staff)	$35,000	$38,390	$3,390
Hydrology & Flood Ops - Rev ([redacted])	$0	$3,570	$3,570
Flood Mitigation, Warnings & EAP (staff)	$91,000	$120,334	$29,334
Flood Mitigation, Warn & EAP ([redacted])	$10,000	$28,545	$18,545
Project Review, Ops, Gauging - BW SD	$38,500	$10,912	-$27,588
Design - M&E - Review of Gates (staff)	$0	$2,462	$2,462
Procurement Mgt	$6,000	$7,475	$1,475
Procurement - Legal Review	$0	$2,656	$2,656
Project & Stakeholder Mgt - AD (staff)	$217,000	$317,275	$100,275
Project & Stakeholder Mgt - Cons ([redacted])	$112,000	$129,162	$17,162
Proj & Stakeh Mgt - Travel & Media	$40,500	$31,895	-$8,605
Proj & Stakeh Mgt - Hyd Model ([redacted])	$10,000	$14,388	$4,388

The total overrun for Phase 1 and 2 combined was $135,858. There is no evidence to justify the overruns such as a documented change in scope; therefore, it is recommended to reduce the claim to the amount of the original budget.

Findings

- Prudency:

  The project is deemed prudent as it was initiated by the Queensland Government and Sunwater were given recommendations to implement. The scope of works defined by the IGEM review was comprehensive and clearly demonstrated the value of the benefits of implementing these recommendations for future flood events.

- Efficiency:

  The project was deemed efficient in terms of both scope and standard; however, the budget overrun of $135,858 was not considered efficient as there is a low level of documentation explaining the overrun. Furthermore, documentation was not provided for the procurement of two of the external services and it is not clear whether it was procured via competitive tender. The impact of these findings on the total expenditure claim amounted to $135,858.

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15DAW01 – Moura Offstream Storage (MOSS)

Project Overview

Replacement of the existing PLC and SCADA control system at MOSS was deemed as essential by Sunwater for a number of reasons. The PLC controller and RTU modules are obsolete and no longer supported by equipment manufacturers. Replacement parts will be difficult to obtain from the markets should a component fail. The scope of the project was to upgrade the control system required to maintain service.

Summary of Findings

Review Summary					
Prudent	✓	Scope	✓	Capital expenditure claim	$260,693
		Standard	✓	Impact of findings on claim	$0
		Cost	✓	Total Accepted	$260,693

Background

MOSS is a part of the Dawson Valley Supply Scheme and failure of the control system will result in Sunwater being unable to fulfil their regulatory requirement to manage water resources at MOSS. The scheme supplies 153 customers and it is essential to maintain service. An inspection identified the control system to be obsolete and immediate works were recommended. The works are to comply with the following.

- Fitzroy Basin ROP (2006);
- Dawson Valley Water Supply Scheme ROL;
- Standard Supply Contract;
- Asset Management Policy;
- WH&S Requirement; and
- ROP environmental requirements.

Options Assessment

Sunwater considered several potential options for the renewal of the control system. These included:

1. Replacement of PLC and SCADA software with Allen Bradley;
2. Replacement of PLC and SCADA software with Schneider;
3. Do nothing.

The ‘do nothing’ option was disregarded as the operational risk posed significant consequences. Sunwater would be at risk of breaching their contractual obligation resulting in negative stakeholder relations as well as risk during a flood or emergency. Option 2 was chosen as Schneider matches with Sunwater’s standard PLC system, personnel would not require additional training and there would be no need for PLC Programming Software licencing.

Implementation

The initial budget is quoted at $52,258 by ‘QCA Information Request A42_15DAW01’ based on the completion of an options analysis and preparation of technical specifications and design. This conflicts with the Scope of Works document (March 2015) that details the cost at $32,258.

The April 2015 Options Analysis provided a cost estimate for the implementation of the preferred option (Option 2) and was quoted at $127,790 with a confidence level of +/- 75%. This included an estimate for direct costs at $69,370.

In May 2016, an Offer Recommendation Report was compiled by Sunwater referring to the three tender offers received. Sunwater selected the bid that offered the best value for money ($78,544) with an approved expenditure of $98,180 (excluding GST) to includes 25% contingency. [redacted] was selected as a result of having the lowest price and strong relevant experience in performing the type of works effectively.

Based on actuals to date and the contractor quote, the cost estimate was revised to $117,588 in October 2016 and then to $150,612 in November of 2016.

In December 2016, there was a contract variation approved for a total expenditure of $110,728 (increase of $12,548). [redacted] were required to return to site to complete outstanding approved variation and an unapproved variation, totalling $14,124. The unapproved variation was a flow meter repair replacement at a total cost of $1,636.

The Prudency and Efficiency document (December 2016) noted an increase to the project cost estimate. The document quotes the previous cost estimate at concept design (June 2016) at $277,995, a figure which is not found in other documents provided. This cost estimate is explained by Sunwater as comprising of the cost estimate at November 2016 of $150,612 and the costs incurred up till FY16 $127,385 ($28,560 in FY15 and $98,825 in FY16 as per 'QCA Information Request A10_Attachment 1_Historical Renewals'). The FY15 and FY16 costs are assumed attributable to project planning and development. The March 2015 Scope of Works document states the FY15 & FY16 deliverables were the options analysis and the design, scope of work and cost estimate for the implementation phase. It is noted that this represents 48% of the total project costs and may be high.

The Prudency and Efficiency document proposed a revised total project cost estimate of $294,639. This is an increase of $16,644 and represents cost to complete of $34,306 less the funds remaining of $17,661. The revised budget for FY17 is therefore a total of $167,256 ($150,612 and $16,644). It is assumed that this comprises the design and construction phase of the project. The additional works and contractor variations noted in the document are deemed to be justified and the cost breakdown is sufficient. The total design and construction phase (FY17 and FY18) are within the accuracy bounds of the cost estimate from the Options Analysis.

Findings

- Prudency:

  This project is deemed prudent as it posed an operational risk to the MOSS and would affect the Dawson Valley Supply Scheme. Loss of operation would detrimentally affect Sunwater's ability to meet service level agreements with its 153 customers. The option chosen to replace the existing control system was effective. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  This project is primarily deemed as efficient in scope and in standard. As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. The cost estimates are revised several times but contractor variations appear well justified. The final construction phase costs (FY17 and FY18) are within the accuracy bounds of the cost estimate from the options analysis. The FY15 and FY16 project development costs are 48% of the total project costs and may be high, but overall the project has shown good cost efficiency.

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15PIO06 – Teemburra Dam

Project Overview

The control system which operates the release of water from Teemburra Dam, the Tannalo offtake, the Palmtree Outlet and the fishlock at Dumbelton Weir has become obsolete. Subsequently, it is necessary to upgrade to reflect modern technologies.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$472,207
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$472,207

Background

The Teemburra control system forms part of the operational infrastructure used in the Pioneer Valley resource operations plan (ROP). If the system fails, Sunwater would be in breach of contractual obligations and this would have a negative impact on stakeholder relations. Sunwater also provides water to several customers downstream as part of their Standard Supply Contract in the Pioneer River Water Supply Scheme. Other requirements include conformance with Asset Management Policy, WH&S Requirement, and Environmental Requirement.

Sunwater's standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1997, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for Sunwater engineers nor PLC Programming Software licencing.

Options Assessment

Four options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively. These options do not include the replacement of the RTUs and repeater stations' equipment and adopts a replace-when-required approach. Option 3 is similar to Option 2, replacing like-for-like with Schneider equipment, however it included replacement of the entire system. Option 4 was the do-nothing option.

A do-nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. Sunwater would also fail to meet public safety if the aged system failed during a flood or another emergency. Based on cost and risk, it was more beneficial to replace the entire control system with Sunwater Standard PLC Hardware (Schneider), Option 3.

Implementation

During the options analysis stage in April 2014, four (4) options were put forward, with Option 3 preferred. Option 3 was estimated to be $165,257 including design, project management, procurement, site supervision, supply, and installation. The line items for direct costs (supply and install) totalled $101,170.

Request for offers was released to five selected suppliers, four vendors responded with offers, [redacted], [redacted] and [redacted]. Two evaluation panels assessed the offers. [redacted]s was chosen for their price, capability, experience, program of works and safety system. A request for best and final offer was sent to [redacted], who agreed to reduce the price by $2,500. The offer awarded was priced at $179,105.90. The approved budget including 10% contingency was $187,116 (ex. GST).

The Prudency and Efficiency document details the project budget increases due to a range of variations each with appropriate justifications. In general, the technical complexity was not completely understood during options analysis or the business case stages. An initial cost estimate was quantified at $221,836 in August 2015. This was then revised to $484,980 during FY16, due to the variations and contingent item purchases. The final contractor costs were $247,609 and the total project cost of $472,207 was slightly under the revised budget. The variations were reviewed by stakeholders and costs were reviewed by the project manager and technical leads. There was clear analysis during each step of the process with a high quality of documentation, therefore expenditure is found to have been efficient.

Findings

- Prudency:

  The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.

- Efficiency:

  As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Further, the best operational outcome and lowest risk of system failure could be achieved by replacing the entire control system. A significant procurement plan was completed for this project. Four offers were received for this invitation, with all offers similar and within $10k of one another. The quotes provided appear to consistent with the prevailing markets. Multiple variations (refer to HB# 1874294) to the original project scope were cited. An increase of $69k was documented for additional contractor costs, while Sunwater had an additional $84k to the original budget estimate. Project Management accounted for $30k, while other costs and resources (such as procurement, travel, etc) was $80k. These additional costs were broken down and provided in the revised cost estimate. The information provided was high quality, and variations to the original budget estimate could be accounted for and justified. Based on the information provided, suitable processes were followed to demonstrate project efficiency.

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16BYR07 – Boondooma Legal Insurance

Project Overview

This project was created to capture legal costs associated with the Boondooma Dam Spillway Repairs Project Insurance Claim. There was no project documentation associated with this project.

Summary of Findings

Review Summary						
	Prudent	×	Scope	✓	Capital expenditure claim	$591,181
			Standard	✓	Impact of findings on claim	$591,181
			Cost	×	Total Accepted	$0

Background

This project was created to capture legal costs associated with Boondooma Dam Spillway Repairs Project Insurance Claim. There was no project documentation associated with this project.

Options Assessment

Options assessment is not applicable as this project only involves legal costs incurred as part of the insurance claim.

Implementation

The November 2018 submission documented $233,118 incurred over FY16 and FY17. The 'QCA Information Request A42_16BYR07 supporting information (2)' file stated there was an initial budget of $430,000 and actual expenditure of $591,181. There is no evidence to support any of these claims.

Findings

- Prudency:

  The legal costs associated with the insurance claim are not considered prudent at this point. It is noted that the insurance claim is not yet resolved. The November 2018 Irrigation Price Review Submission states that the insurance proceeds have not been added to the modelling, but the flood damage costs have. It is recommended that the costs be rejected until the insurance claim is settled, as the revenue from the insurance claim will offset the costs, potentially including the legal fees. Furthermore, as is referenced in clause 3.21 of the Australian Law Reform Commission publication 'Costs Shifting - Who Pays for Litigation (ALRC Report 75)', it is common for courts to order the defendant (i.e. insurer) to pay the plaintiff's (i.e., Sunwater) costs pursuant to the costs indemnity rule. For this reason, all or part of the $233,115 legal costs may be payable by the insurance company. We suggest that this project is included in the claim when all final documentation is available and can be provided for review.

- Efficiency: N/A

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16CUW02 – Allan Tannock Weir

Project Overview

Estimated leaks of 1 ML/day were identified at the outlet works of Allan Tannock Weir by Paroo Shire Council. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$25,903
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$25,903

Background

The Cunnamulla township receives water supply from the storage at Alan Tannock Weir. Leaks estimated to be 1ML/day were identified by Paroo Shire Council at the outlet works of the weir. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.

In its original state, the weir gate is non-compliant as it is leaking, resulting in significant water loss and risk to the long-term water security of Cunnamulla. Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme. Immediate works were required in accordance with the corrective order.

At the time of the observations, the asset was 25 years old. Mechanical parts typically have a serviceable life up to 20 years, so the gate was likely due for replacement. Before photos clearly show active water leak from the weir outlet works. A special meeting held between Sunwater and Paroo Shire Council noted that readings from the Allan Tannock Weir indicate approximately 7.69 ML/day storage loss is occurring through the valve, seepage and evaporation.

Options Assessment

Emergency works were required to repair the leak at Allan Tannock Weir. Initially, the proposed treatment was seal repair of the existing gate; however, undocumented modifications resulted in this being unfeasible. The following action was replacement of the gate entirely. No formal options analysis process was undertaken and the processes for corrective action were reactive. A non-capex solution, such as a “do nothing” option, was not feasible as not proceeding with corrective works would put Sunwater in breach of their regulatory obligation under the Cunnamulla Weir Supply Scheme.

Implementation

There is little documentation on the capital expenditure as this project was not planned, instead was the result of a corrective order. The leaking gate may have resulted with an impact on the water supply for Cunnamulla, so temporary solutions were provided until a new gate could be fitted. In February 2016 a cost estimate was set at $20,000. This was revised to $37,000 in March 2016. [redacted] fitted a new gate, however this did not seal properly and had to be welded shut. During a period of low flow, [redacted] returned and replaced the gate with one that sealed properly. It is unclear what costs were incurred, what was quoted by the contractor, and whether the contractor billed Sunwater for the failed attempts.

The risk assessment provided is not sufficient to detail and confirm safe work methods were implemented during repair works. It was noted in the documents that there was concern the Sunwater staff, the contractors on site and members of the public (with ready access to the site) may have been at risk if the isolation had failed. Sunwater could face considerable legal liability if death or serious injury would have occurred. Furthermore, the Prudency & Efficiency document states that designs and any asset modifications must have RPEQ sign-off to ensure safety. There is no documentation showing RPEQ participation and the As-Built drawing does not show RPEQ sign-off.

The quality of documentation is very low and it is not clear if spending was efficient in scope, standard and cost. The Project Closure Report states expenditure totalled $30,737 in June 2016, however the QCA claim stated a total of $25,903. Given that this figure is higher than the claim amount, there is no impact of findings on the claim.

Findings

- Prudency:

  The leaks observed at the Alan Tannock Weir pose a serious threat to the water security of the Cunnamulla township. It is evident, based on the information provided, that this project is prudent to the continuation of the town's secure water supply. Without repair works, Sunwater will be in breach of their regulatory obligation to provide a consistent water supply under the Cunnamulla Weir Supply Scheme. Given the urgency of the project, some processes were not adhered to and documentation such as the Project Plan, Design Brief, Scope of Works, and Budget Estimate were not submitted. The overall quality of documents could be improved.

- Efficiency:

  Appropriate processes for project management, scoping of works, budget estimation, procurement, and general record-keeping were not followed, resulting in inefficient project execution. There was insufficient information to properly justify the project expenditure and conclude whether the treatment was appropriate for the repairs required. Despite the documentation issues and given the relative materiality of the costs, the scope of work and costs incurred can be considered appropriate. Furthermore, the claim amount of $25,903 is less than the project closure report expenditure amount of $30,737; therefore, it is assumed that a reduction in claim has already been applied.

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16MVA01 – Mary River Barrage

Project Overview

Reinstatement of the downstream rock protection of the Mary River Barrage was deemed as essential by Sunwater for a number of reasons. The displacement of rock protection could lead to damage of the downstream row sheet piling which supports the crest of the barrage. Crest failure would lead to an uncontrolled release and loss of storage, threatening the water supply of the Lower Mary Supply Scheme. The scope of the project was to repair the damage to the rock protection prior to the wet season to prevent further damage to the asset and scouring of the rock protection.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim	FY16-18: $386,652 FY19: $397,200
Impact of findings on claim	FY16-18: $0 FY19: $0
Total Accepted	FY16-18: $386,652 FY19: $397,200

Background

During the 2009 flood, rock protecting the downstream toe of Mary Barrage was displaced. The rock was replaced in December 2014 prior to the wet season. The 2015 floods subsequently displaced this rock again and temporary repairs in December 2015 were undertaken to prevent further damage in the upcoming wet season. These repairs did not reinstate the downstream area to its original profile. The historical damage indicated that displacement was likely after significant flood events and that rock protection is prudent to the water security of the scheme.

Options Assessment

Sunwater considered several potential options to deal with the Mary Barrage flood damage. They are listed below.

1. 'Do nothing';
2. Replace rock as done in 2014:
    a. Replace with 600mm rock;
    b. Replace with 800mm rock.
3. Use of concreted rock fill to EL 0.0 and inject with concrete;
4. Replace rock with a concrete slab;
5. Replace rock with tetra blocks (pre-cast concrete) or similar.

The 'do nothing' option was disregarded as there was an unacceptable risk of the Mary Barrage failing and losing storage supplying the Lower Mary Supply Scheme. The cost of Options 4 and 5 were substantially higher and the long term benefits did not differ significantly from the remaining options. Option 2 was the same repair method that has been utilized by Sunwater in the past and would likely result in repairs being required every 1 to 2 years (as has been experienced in the past). Option 3 provided the robust protection without frequent repairs at a relatively low cost. It was the preferred option.

Implementation

Sunwater's initial cost estimate (September 2015) for Phase 1 and 2 was $98,692.20; although, it is noted that this cost estimate did not include construction costs. The options assessment revised the cost to $1,297,029.58.

In February 2017 an “Offer Recommendation Report” was compiled by Sunwater referring to the six tender offers. There were two non-conforming offers (submissions were incomplete and significantly insufficient) and the remaining four offers were assessed against the evaluation matrix. Two tenderers were shortlisted, one offer was rejected due to the use of existing material in their chosen methodology (does not conform to specification) and one offer had limited information in the methodology and a lack of experience for similar works. Sunwater selected the bid that offered the best value for money ($383,571.12) from the remaining two short-listed. The chosen bid aligned with Sunwater’s internal estimates and was inclusive of all scope of works outlined in the specification.

Sunwater included a variation amounting $39,787.86 citing additional requirements for demobilisation/remobilisation, additional materials, and minor repairs as part of a variation that the Evaluation Committee determined was required, resulting in a total approved amount of $423,358.98 (excluding GST).

Construction commenced in 2017. Rock base was established and a small section of concrete was poured, then a rain event cancelled the work and rock was displaced. This not only caused rework, but also a slight redesign, which increased concrete quantities. Work restarted in October 2018, rock was reinstated and a steel concrete pumping line installed, then another wet weather event forced the project to be postponed. Rock was again displaced. Work restarted in February 2019 and rock was reinstated and concrete poured to 85% of the area. Tidal conditions then delayed work for another 2 weeks, but conditions returned to favourable and the work was completed in March 2019.

A Sunwater non-routine project change request form was submitted 27 Feb 2019 to request the increase to the project budget and purchase order. The original approved project budget and revised project budget is cited at $397,200.00 and $589,000.00 respectively resulting in a total budget variation of $191,800.00. This does not align with the total variation increase and decrease amount totalling $193,700.00. Additional concrete quantity and price increases led to a variation increase of $173,000.00. An increased concrete rate is quoted at [redacted] implying the required quantity of concrete of [redacted], however the quantity of concrete cited in the report does not align with this number. The purchase order value is also quoted in this non-routine project change request form. The original approved purchase order value and revised purchase order is cited at $413,172.62 and $620,000.00 respectively resulting in a purchase order variation of $206,827.38.

Sunwater’s final capital expenditure claim is cited at $973,938.00. The FY16, FY17, FY18 capital expenditure cost is cited at $386,652.00, implying a $587,286.00 spend in FY19. This is close to the revised project budget quoted in the project change request form. No information regarding the breakdown of costs for the capital expenditure claim prior to FY19 is available; however, the total project costs were under the original $1,297,029 estimate from the options analysis report, and this was despite all the rework, redesign, and multiple mobilizations/demobilizations due to the wet weather events.

Findings

- Prudency:

  This project is deemed prudent as it posed a water security risk to the Lower Mary Supply scheme. Loss of storage would detrimentally affect Sunwater’s ability to meet service level agreements with customers. The option chosen to repair the rock protection was effective in restoring and protecting the asset from further damage in future weather events. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

  The project was deemed as efficient in terms of both scope and standard. The works were clearly assessed for their appropriateness and completed in accordance with relevant standards.

  The total project cost is also deemed efficient. Appropriate procurement processes were used to engage the contractor. The contractor variations were all well justified and documented. The total project cost, despite all the rework, still amounted to less than the cost estimate from the options analysis.

  Note that the capital expenditure claim is $386,652. This excluded the FY19 works for $587,286.00, which when included increases the total to $973,938.00. It is also noted that the current FY19 CAPEX claim is only $397,200.

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16PRO03 – Peter Faust Dam

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. Damages observed at the spillway and right training wall of Peter Faust Dam may worsen without intervention and ultimately lead to failure of the structure.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$607,160
			Standard	✓	Impact of findings on claim	$0
			Cost	✓	Total Accepted	$607,160

Background

Peter Faust Dam provides regulated releases for downstream irrigation and urban usage from the Proserpine River and through the Kelsey Creek Pipeline and provides a degree of flood mitigation. Damages observed at the spillway and right training wall may worsen without intervention and ultimately lead to failure of the structure. The works are required to maintain compliance with Sunwater's Asset Management Policy, WH&S Requirement, and Dam Safety. Peter Faust Dam is classified as an Extreme Hazard Dam in accordance with Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD 2000b) and QLD Guidelines on Acceptable Flood Capacity for Water Dams (DEWS 2013). Sunwater have a regulatory obligation under the Proserpine Supply Scheme, Resource Operating Plan (ROP), and Organisation Reputation. Further investigation of the spillway was required to determine the most appropriate corrective action. The timing of the expenditure was appropriate with works to be completed prior to the following wet season to prevent further damage from occurring.

Peter Faust Dam was constructed over a two-year period, completed in 1990. Given the serviceable life of concrete is typically 50 years, it can be concluded that the asset life is not consistent with standard run-to-failure life expectancy. However, the damages observed to the concrete components of the spillway chute may be a combination of spills over the dam and seepage issues resulting from blocked weep holes which have caused voids under the concrete structure.

Options Assessment

A “do nothing” option was considered, however disregarded as the consequences of not proceeding would have resulted in greater costs in the future as well as significantly increased risk to safety and water resource management. With consideration of timing, cost, benefits and risk, the preferred option was determined to be Option 1 (the only alternative to “do nothing”), which was to proceed with the repair of potential voids under "drummy" spillway slab, path Spillway Chute Flood and Right Training Wall cracks and reinstate the existing spillway drainage system.

Implementation

An expenditure claim of $607,160 was made to the QCA. The project progressed into two distinct stages which occurred in 2016 and 2018.

Options analysis compared the benefits of repairing the spillway to doing nothing in March 2015. Repairing the spillway was estimated at $101,000. Business case in November 2017 priced undertaking a spillway investigation at $335,000, with $260,000 going towards a site investigation.

For Investigation of Anchors, Concrete and Drainage Works offer awarded to [redacted] for the sum of $111,245 (ex. GST, incl. 10% contingency) in January 2016. [redacted] also submitted a tender, however it was after the closing date so the offer was not evaluated.

In June 2016, [redacted] had an offer rewarded for the reinstatement of two anchors of $42,751 (ex. GST). An exemption from competitive procurement was obtained for the contract due to urgency in getting a contractor to site. [redacted] had previously been engaged by Sunwater for anchor testing, in turn the price offered was deemed acceptable.

The Prudency and Efficiency report for May 2016 stated that the previous cost estimate of $149,643 in July 2015, however this was revised to be $264,643 for the 2016 scope of works. The increase was due to an increase in contractor, supervision and travel costs. All work was carried out by an experienced contractor using an acceptable methodology, and costs were deemed to be efficient. It was noted that the intended scope was not completed because concrete depths were thicker than anticipated and core drilling was taking longer. The drainage pipe could not be located in the first excavation attempt. For these reasons, the scope was cut short to maintain the allocated budget. The remaining scope (and new additional) was planned for 2018.

In February 2018, three offers for the spillway investigation were evaluated. [redacted], [redacted] and [redacted] all submitted offers. [redacted] was chosen as the most cost efficient with a price of $229,480 (ex. GST, incl. contingency of $60,000). This [redacted] price combined with estimations for supervision, day staff, project management, accommodation and year-to-date costs came to a total of $308,051, under the approved budget of $336,700 for the 2018 stage of works.

The Prudency and Efficiency report for June 2018 stated a previous cost estimate created at the commencement of the spillway investigation in March 2018 of $336,700 be revised to $349,751. The investigation methodology was in accordance with the project scope and no other more cost efficient was identified.

Findings

- Prudency:

  It is evident, based on the Inspection Report, Options Analysis and Business Case, that further investigations are required to determine the extent of damage at Peter Faust Dam and subsequently the most appropriate treatment. There was clear demonstration of prudency given the high quality, detailed information provided.

- Efficiency:

  There were several unplanned material changes to the scope and budget throughout this project. It is clear that because the appropriate PM processes were in place, these changes were effectively managed, and the project was successfully completed. The relevant approvals were provided in accordance with Sunwater's delegations (via SAP workflow / digital signature). The high-quality documentation provided was adequate in demonstrating project efficiency.

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17BBR04 – Eungella Dam

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. The main outlet conduit forms an integral part of the Eungella Dam's operation. Sunwater's inability to maintain it warrant works to restore the conduit to its intended design. Further, leaks through the stoplogs which seal the inlet tower were identified as a risk to the dam in the long term.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim	FY17-18: $408,257 FY19: $672,553
		Standard ✓		
		Cost ×	Impact of findings on claim	FY17-18: $0 FY19: $227,477
			Total Accepted	FY17-18: $408,257 FY19: $445,076

Background

In its current state, the Eungella Dam outlet conduit does not comply with dam safety schedule requirements, as Sunwater are unable to inspect the conduit, guard valves and associated fittings. Sunwater have a regulatory obligation to provide water under the Bowen Broken Supply Scheme. Failure of the conduit would result in a lack of ability to supply water, thus potential expensive legal costs to Sunwater and customers that are dependent on the supply of water from the Eungella Dam. Works were required to minimise the possibility of further increases in leakage through the stoplogs and non-compliance to the dam safety schedule requirements. Dive investigation found water visibility of less than 300mm on upstream side, but the face of the stop logs reported to be undamaged concrete structure. The downstream side had 50% of the stop log front faces with gaps ranging between 2mm to 20mm. Silt deposit inside the inlet tower base was measured between 1.2 and 1.5m deep. The condition assessment of the stoplogs support the project need.

Options Assessment

Five options were identified and assessed as part of the scoping process. These options include placing mass concrete upstream; installing upstream formwork, reinforcement and concrete; installing upstream stoplogs, installing upstream metal baulk, and doing nothing.

A "do nothing" option was considered, although multiple constraints and risks were identified which negated its feasibility. The flow rates through the stoplogs would continue to increase without intervention, critical infrastructure could not be inspected in accordance with Sunwater's dam safety schedule, risk of failure to supply water to customers within the short to long term period.

The best option was determined from an MCA based on the criteria of benefits, timing, net cost, customer/client, and risk. From this, the recommendation from Sunwater was to proceed with Option 1, which was to place mass concrete upstream.

Implementation

The documentation quality has been deemed low. The project information is predominantly only available from the Business Case document.

In August 2016 during the scoping works, the planning cost estimate was evaluated at $42,361. The business case (dated March 2018) stated that a total of $295,273 had been spent across FY17 and FY18 on project initiation, site investigations, options analysis, business case development, and tender document preparation. During this phase, a competitive procurement process appears to have been completed for the dive inspection and options development; although only one bid was received. No details were provided on the actual bid other than an informal cost breakdown. A procurement exemption was also used for [redacted] to provide a third party technical review of the options.

The business case (March 2018) included an estimate of $558,059 (ex. GST, incl. 50% contingency) for the design and construction phase of the selected option. There was no evidence provided on the procurement of the design/construction contractor nor was there a breakdown of actual expenditure; therefore, it is not clear what the final contractor costs were. A practical completion certificate was included that identifies works completed in October 2018.

Based on the March 2018 business case, the final budget is $853,333 for all phases of the project, which included a large contingency. The historical project CAPEX claim is $408,257 (i.e, actuals to date in QCA Information Request A42_17BBR04 supporting information). The future (or transitional years) CAPEX claim is $672,553 in FY19. The combined total is $1,080,810, which is $227,477 over budget. Considering the design and construction estimate had a large contingency built in, coupled with the lack of any documentation and justification for the overrun, an adjustment of $227,477 is recommended for FY19.

Findings

- Prudency:

  Based on the information provided, Sunwater would be in breach of their dam safety requirements due to the unsafe access for inspection and repair of the outlet conduit, guard valves and associated fittings. Failure of the outlet conduit would lead to the inability to supply water. Sunwater are required under the Bowen Broken Supply Scheme to provide water supply from the Eungella Dam to customers. There is reasonable justification for the scope of works described under this project. The overall quality of documentation provided is medium.

- Efficiency:

  For historical years (i.e., before FY19), it is identified as an efficient project (pending design and construction phase documentation). The documentation quality for the project development phase is high. Business case and detailed cost estimate have been done, and the costs are reasonable for this project. Since there is no evidence provided for the procurement of the design and construction phase, or any breakdown of project actual expenditure, the documentation quality is deemed low. This also has a significant impact on the project cost efficiency. A practical completion certificate states October 2018 project completion. It has been assumed that the project cost claim of $408,257 includes the design and part of the construction phase up to end of FY18. The FY19 CAPEX claim is $672,553. The combined CAPEX claim would be $1,080,810, which is $227,477 above the budget set in March 2018. Considering this budget had ample contingency built in, coupled with lack of documentation and justification for budget overruns, an adjustment of $227,477 is recommended for the FY19 year. The FY17-FY18 component has been assumed reasonable.

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17BRI31 – Giru Weir Outlet Works

Project Overview

Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with pass flow under the Burdekin ROP. The outlet works upgrade involved a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	$766,806
			Standard	✓	Impact of findings on claim	$144,517
			Cost	×	Total Accepted	$622,289

Background

Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with Section 88 Part (3) of the Burdekin ROP. The required works consisted of a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.

Options Assessment

Four options were considered as part of the project scoping phase. These include:

1. Design and install weir bypass pipeline and meter (manually operated);
2. Design and install weir bypass pipeline and meter (remotely operated);
3. Design and install on-weir pipeline and meter (manually operated);
4. Design and install on-weir pipeline and meter (remotely operated).

After considering the functional requirements, risk profiles and whole of life costs, Option 1 was determined to provide the most appropriate arrangement and is the recommended option for further consideration for detail design and construction. A do nothing and a temporary pump arrangement option have been rejected due to unacceptable WHS risks and the inability to properly meet the ROP requirements.

Implementation

The Options Analysis estimated a project cost of $230,134 but the Project Scoping Document used a budget of $514,299, which was based on costs derived from designs completed under project 10BRI08 in 2012. The budget used has a (+/- 50%) contingency included.

The Project Management Plan identified that a contractor would construct the project, but to maintain the proposed schedule, Sunwater proposed to purchase long lead time materials directly. Sunwater requested procurement exemptions to sole source $45,000 of sheet pile, $20,000 of DN630 PN6.3 poly pipe, $12,500 Siemens flow meter, and an $18,916 [redacted] DN600 butterfly valve. The construction was competitively tendered with five bidders. [redacted] was awarded a $426,013 lump sum contract based on their technical suitability, their pricing, a clear schedule, and inclusion of contingency for the dewatering risk.

In the Briefing Note dated 2 March 2017, an additional funding of $246,464 was requested to be sourced from the unspent annuity for the [redacted] contract and added to the approved budget for project 17BRI31. The budget with additional funding becomes $760,764. The increase in cost was due to the higher costs of the materials and contractor pricing, as well as $240,000 in project development costs already incurred. The $240,000 does not align with the final project actual costs, which total $173,233 for all non-contractor costs. It appears that the justification for the price increase is inaccurate.

The December 2017 Prudency and Efficiency document stated the previous June 2017 cost estimate was $749,400 and a proposed increase of $33,968 to a budget of $783,368. The cost increase was justified by an increase in dewatering machinery necessary to complete the project. A strict deadline of the end of FY17 prevented the option of delaying until water levels were lower. This price increase could be considered unjustified, as the procurement recommendation for [redacted] was partially made due to the inclusions of contingency for dewatering.

The Project Closure Report stated works were completed in April 2018. The final total expenditure was $766,806. The contractor and material costs totalled to $633,378, which was higher than the combined totals of $522,429 specified in the procurement documents. There are no itemized variation reports and justifications for materials or contractor costs. This $110,949 difference is considered an unexplained overrun and should be absorbed by Sunwater. Furthermore, the $33,968 variation requested for dewatering should also be absorbed by Sunwater (or its contractor), as this risk was already accounted for in the contractor pricing. In total, an adjustment of $144,517 is recommended.

Findings

- Prudency:

  Changes to Giru Weir are necessary to meet the flow requirements under the Burdekin ROP. Inability to rectify this puts Sunwater at risk of persecution for breaching their regulatory requirements. As such, these works are considered to be prudent and immediate works are justified.

- Efficiency:

  To meet the requirements under the Burdekin ROP, the appropriate project management processes were in place to enable efficient project delivery. Several options were assessed against an MCA as part of a High-Level Options Analysis. The preferred option was progressed to detailed design and construction, with all works completed in accordance with Sunwater technical specifications and current industry standards. The detailed design report captured all aspects of the construction works, with as built drawings provided at project completion. The contractor and materials costs appear to have incurred overruns beyond their original quotes. Lack of appropriate justifications for the overruns have led to the conclusion that an adjustment of $144,517 is warranted.

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Appendix B

Project Reviews for Transitional and Forward Renewals

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13NMA02 – Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower

Project Overview

This project involves the investigation and stabilisation of the rock face and slope below the lookout at Weemah inlet tower. The slope has experienced numerous rock falls, which poses a safety to risk to both staff and the public. Damage to guardrails and meteorological equipment has occurred. Investigations, assessment, and design have been completed in FY14 through to FY17 to define the proposed solution to the slope instability. The final scope of work and budget is unclear, but it appears to have been postponed to FY23.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY21-24: $486,960
			Standard	✓	Impact of findings on claim ($FY19): FY21-24: $0
			Cost	✓	Total Accepted ($FY19): FY21-24: $486,960

Background

Fairbairn Dam was designed by the Snowy Mountains Engineering Corporation and constructed in 1972. The main dam is a 46 m high earth-fill structure, extending for 823 m between abutments. An un-gated concrete lined spillway is located at the left end of the embankment against the left abutment. The intake tower is located adjacent to the right abutment and discharges to a concrete lined channel downstream of Selma Road.

Instability of the slope immediately below the right bank lookout has been noted in an inspection undertaken in 2009. Subsequent intermittent slope failures have been recorded. Slope failures typically occurred as discrete rock falls onto the access track to the intake tower with the rocks being of sufficient size to damage the Armco guardrails. The most recent failure resulted in damage to a guard rail and Bureau of Meteorology monitoring equipment located close to the toe of the slope beyond the existing guardrail. During previous inspections, voids were identified and could be traced into the slope for in excess of a metre.

An internal project (13NMA02) was initiated to investigate the Rock Face Stability which included Survey, Geotechnical Mapping, Drilling and Testing to facilitate the assessment of the stability of the rock slope below the lookout. A June 2014 memorandum summarizes the visual inspection conducted that year and provides technical review of the instability. It recommended temporary safety measures and a longterm solution to the instability. Based on the hazard assessment, the slope was recommended to be stabilised as soon as possible.

This part of the project focuses on the last phase of the rock stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.

Options Assessment

A September 2016 annual dam safety inspection sign-off document shows that the Stage 1 (Options Study) was completed in FY16 but not details were provided. The March 2017 cost estimate also costs out four options, but doesn't correlate the options to any options assessment process.

Implementation

The 2014 Fairbairn Dam Annual Inspection Report included a recommended line item in the 2016-2020 refurbishment program for this project (13NMA02) at a cost of $298,374 to be completed in FY16.

A September 2016 annual dam safety inspection sign-off document shows that the Stage 1 (Options Study) was completed in FY16. The site works were planned for FY17. The total budget for Stage 1 and Stage 2 appear to be $317,000. The document requested a change to the project completion date to June 2017. The approved budget for FY17 was $243,111.

Issued for Construction design drawings were completed in December 2016, then revised to reduce the scope in April 2017. This reduced scope included removing the rock face stabilisation fence and retaining wall.

A March 2017 Phase 3 Cost Estimate includes four different estimates:

- Option 1 (General site clearance, signage, and barriers) - $213,690 (+/-50%)
- Option 2a (Reprofile slope and improve lateral and cross drainage) - $914,057 (+/-10%)
- Option 2b (Reprofile slope and improve lateral and cross drainage) - $369,180 (+/-10%)
- Option 3 (Install bolts/anchors and face treatment) - $591,801 (+/-50%).

Based on the Issued for Construction drawings, it appears that either Option 2a or 2b was pursued. The drawings do not show any evidence of bolting and shotcreting as per Option 3. Option 1 does not include any reprofiling of the slopes.

The drawings show a cumulative cut volume of 720 m^3. Option 2a has a total of 1,300 m^3 for excavation and reprofiling for a total of $337,900. Option 2b calculates excavation by [redacted] rates as opposed to volumetric rates. It has a total of $58,000 for an excavator and tipper. Based on the cost, it appears Option 2b allowed for approximately [redacted]. Neither of these match the estimates in the drawings.

Option 2a also had a concrete retaining wall for $92,000. The drawings do not appear to have any scope for a concrete retaining wall. It is therefore assumed that Option 2b was the preferred option but has underestimated the cut volume. Scaling the cut volume up to 720 m^3, the total project cost becomes approximately $528,000 (in $YF17). Converted to $FY19, this is $546,420.

The CAPEX claim for FY23 is $532,860 in nominal dollars ($486,960 in $FY19). As this is less than the scaled cost estimate, it appears to be a reasonable estimation of the scope.

That said, it is unclear whether any works were completed in FY17, FY18 or FY19, and what the actual scope of work planned for FY23 involves. For the purposes of this review, it has been assumed that the full works as described in the documentation have been delayed to FY23.

Findings

- Prudency:

  Rock instability of the right abutment adjacent to the Weemah inlet tower poses a safety risk. Given that a series of rockfalls have been recorded at this location, immediate works are justified to minimise the risk of further rockfalls. There is sufficient evidence in the documentation provided to consider this project as prudent.

- Efficiency:

  For the proposed rock stabilisation works, there is insufficient information provided to comment on project efficiency. No alternatives were formerly identified. The cost estimates do not match the Issued for Construction drawings. There were no technical documents provided including procurement details despite it being understood that the project is in its final stages and was supposed to be delivered in FY17. Assuming all works have been delayed to FY23 and scaling the Option 2b cost estimate for higher excavation/reprofiling quantities, the CAPEX claim would appear to be reasonable.

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15LFZ01 5 Yr Dam Comprehensive Inspection Weir Program

Project Overview

The Eden Bann Weir has been assessed as “high risk” in the Risk Assessment of Sunwater Weirs. The potential failure of the weir could have severe implications to operations of a key customer (Stanwell Power Station) and impact the greater community as part of the Lower Fitzroy Scheme. The scope of the project is undertaking inspection and is to be delivered in 2022 and every 5 years thereafter. The level of documentation is of a low quality and the underlying basis for carrying out the inspections is not clear as there is conflicting information in the documentation provided.

Summary of Findings

Review Summary				
	Prudent	✓	Scope	✓
			Standard	✓
			Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $41,899 FY25-53: $259,985
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $0 FY21-24: $41,899 FY25-53: $259,985

Background

The Eden Bann Weir is part of the Lower Fitzroy scheme. The weir is not a referrable structure under the Queensland Dam Safety Management Guidelines, so the project does not have a regulatory driver. Instead, as a result of the Moolabah Weir incident in February 2012, a formal review of Sunwater weirs was undertaken with a January 2014 report titled *Risk Assessment of Sunwater Weirs.* The report assessed the weirs for risk, classified their criticality, and recommended risk mitigation measures to be applied.

The Eden Bann Weir was identified as “high” risk as the consequence of its failure would affect the Stanwell Power Station, thus impacting the greater community. Appendix C lists the asset criticality as Major.

Section 2.2 of the Risk Assessment Report states that 'minor' weirs undergo 5-yearly inspections. Section 3.3 suggests that any weirs with a “high” risk rating for service delivery should be inspected annually (also reiterated in Section 5 Recommendations). Table 3-2 lists these weirs, which includes Eden Bann Weir. Based on this, it appears the current 5-yearly inspection frequency could be increased to annually.

It is also noted that the asset register (June 2019) shows the Eden Bann Weir was rated at 2 (moderate) in 2018.

While the scope of works for the study/inspection is unclear, the available documentation makes reference to the use of Sunwater’s methodology for Condition Assessment of Assets and that there will be an assessment and review against the Queensland Dam Safety Management Guidelines which detail the key requirements.

Options Assessment

Options assessments are not relevant to a study/investigation.

Implementation

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. The weir is smaller and less complex than a large scale dam. The average capital expenditure claim of $43,000 ($FY19) per investigation/study is approximately one third that of the other 5-Year Dam Inspections, therefore it is considered reasonable. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed to be prudent as it serves as a risk reduction method to the water security risk for a key customer as part of the Lower Fitzroy Scheme; however, there is inconsistency and a lack of detail in the documentation provided. It appears the inspections had been proposed to be annual. The scope of works is not defined clearly and the general documentation quality of this project is low.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and considering its size vs a large dam, the cost is less (one third) than other 5-Year Dam Inspection projects. As such, it has been considered reasonable.

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16BAL12 – Beardmore Dam – Thuraggi Channel Repair

Project Overview

Beardmore Dam is the major storage for the St George Water Supply Scheme. Recent condition assessments reveal evidence that the Dam structure may be compromised due to active piping and seepage which is undermining the structure. This project involves the proposed remediation works to prevent further damage to the channel and restore it to its original condition.

Summary of Findings

Review Summary

Prudent	✓

Scope	×
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19: $1,338,120
Impact of findings on claim ($FY19)	FY19: $0
Total Accepted ($FY19)	FY19: $1,338,120

Background

Beardmore Dam is the major storage for the St George Water Supply Scheme and is located 21 km upstream of the town of St George. The dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. The dam also has minor flood mitigation ability.

In July 2015, the outlet to Thuraggi Channel was dewatered and an inspection was undertaken. Damage to the rock mattresses were identified, sand boils had formed, and seepage on the outlet right bank training wall. A short term solution was necessary to reduce the hydraulic gradient on the outlet structure, while a long term solution was developed. The rock mattresses were repaired in FY16, a temporary coffer dam was installed. Temporary works continued to be carried out to meet service levels and protect the channel.

The current condition of the channel was determined to be a safety and operational risk that could put SunWater in breach of their regulatory requirement under the St George Bulk Scheme. Several key conclusions from the Risk Assessment include:

1. There is evidence that an active piping process has developed within the foundation sands below the outlet structure;
2. The estimated probability of failure of the outlet structure is very high (1 in 6). The dominant failure mode is backward erosion piping through the foundation sands below the structure;
3. The societal risk for the outlet structure in its existing condition plots about half an order of magnitude above the limit of tolerability for existing dams, and therefore the risks are assessed to be unacceptable according to the ANCOLD guidelines;
4. SunWater have already implemented interim risk reduction measures to manage the risk in the short term, and this includes operational restrictions on water levels in the channel, more frequent inspections and stockpiling of emergency materials at site;
5. The preferred upgrade option is to infill the channel downstream of the outlet structure. This option is predicted to reduce the risk to negligibly low levels.

Beardmore Dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. These works are required to maintain strategic alignment with Sunwater's Corporate Plan and Statement of Corporate Intent which is to, "Operate and maintain Sunwater's existing water infrastructure assets to ensure continued delivery of water to customers and communities in line with shareholder expectations." Ultimately seepage leading to instability of the dam embankment is a dam safety issue that needs to be addressed.

A Needs Analysis by Sunwater in the Detailed Options Analysis shows that the works are required to ensure compliance with ROP/ROL, Asset Management Policy, WH&S & Dam Safety, and Reputation.

Options Assessment

Four options were identified in the scoping phase. This includes:

1. Extend outlet culvert downstream;
2. Construct upstream clay blanket;
3. Construct sheet piling cut off;
4. Do nothing.

The preferred option was to proceed with Option 1. This involves construction of a base slab in the channel bed then installing two barrels of 1500 x 1500 box culverts for 40m. The channel would then be backfilled to effectively move the outlet 40 m downstream. A set of rockfill mattresses would be installed at the conduit exit for score control in the earth channel. This is supported as the long-term remediation option in the Final Geotechnical Report.

Not proceeding could lead to failure of the embankment resulting in Sunwater being unable to supply water to customers in the St George Irrigation Area.

Implementation

A November 2015 cost estimate describes a project to install a filter zone between the Thuraggi inlet and outlet for a cost of $193,152. Issued for Construction drawings in August 2016 describe works to remove existing rock mattresses and geofabric, excavate the bed and banks, add a new sand filter, and concrete rockfill to placed. The works were cancelled due to high storage levels and predicted inflows.

The June 2017 Project Scoping Document estimated a project cost of $1,500,000 including a 50% contingency. An increase in the current budget of $361,358 would be required. Planning and design were scheduled for FY18. Construction would occur in early FY19.

In late 2017, risk assessment was sole sourced to [redacted] for $49k based on their expertise and the project urgency. Two quotes were obtained for drilling for cone penetration testing, each around $17,000. Geotechnical investigation was sole sourced to [redacted] for $8,000 based on their existing knowledge of the project.

A total of $450,866 were incurred in FY17, of which $30,282 were considered scheme costs and the remainder dam safety improvement costs.

In FY18, temporary works were completed to mitigate short term issues. Design of the long term solution continued. Total costs incurred as of February 2018 were $262,287 of which all was considered dam safety improvement costs.

The June 2018 concept drawings show a sketch of a 40m long channel outlet extension and a new outlet structure.

A November 2018 briefing note recommended a FY19 project budget of $4,000,000 (including $175,000 in contingency), which involved an increase from the $1,338,648 budget to $3,825,000 (exc contingency). The document also describes an RFO that was issued in October 2018, with two offers received. Both exceeded the previous budget allowance. The preferred supplier was $3,500,000 with an 8-week construction schedule. Based on the higher cost and longer schedule than expected, Sunwater proposed to revisit the options. A staged approach was then recommended, which would allow the increased schedule, but would not reduce cost.

The scope of work and RFO was updated to reflect the staged approach in December 2018.

The January 2019 briefing note reiterated the same budget increase to $4,000,000 (inc $175,000 in contingency). The total existing approved budget across all financial years was $2,212,963. The total project cost to date across all years at the time of the briefing was $1,040,874 with only $166,559 incurred in FY19 (as at January 2019). The requested budget for FY19 was $3,825,000.

A Project Management Plan, dated February 2019, was started but is predominantly template text.

The revised budget of $3,825,000 appears to be reasonable based on the detailed options analysis, technical scope of work, and competitive procurement process. The CAPEX claim amount for FY19 is $1,338,120 and therefore does not reflect the requested increase in budget. The works as described could not be delivered for the current CAPEX claim.

Findings

- Prudency:

  Beardmore Dam forms a critical part of the St George Bulk Scheme. Piping of the outlet right bank training wall among other issues such as erosion and sand boils present sufficient evidence that the dam's structural integrity is at risk. With a high chance of failure predicted for the dam (1/6 probability), it is evident that these issues must be rectified immediately. Given the consequence of dam failure both in terms of flood mitigation and irrigation supply, this project is therefore considered prudent.

- Efficiency:

  A defined project scope has been provided and a detailed options analysis completed. While the procurement process appears to have been competitive, the two offers were not provided for review. It has been assumed that they match current market conditions and the initial project cost estimate was significantly underestimated. The scope and standard appear to be reasonable for the revised budget of $3,825,000, but the CAPEX claim of $1,338,120 does match this estimate. A partial delivery of the scope may affect quality and efficiency of the overall project. For this reason, the scope was been deemed not reasonable.

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17BBR02 – FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)

Project Overview

The Gattonvale Offstream Storage embankment was damaged by Cyclone Debbie in 2017. This project involves the rectification of these damages through placing of sand gravel bedding on the storage walls, followed by placement of riprap.

Summary of Findings

Review Summary					
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19: $586,391
		Standard ✓	Impact of findings on claim ($FY19)	FY19: $0
		Cost ✓	Total Accepted ($FY19)	FY19: $586,391

Background

The Gattonvale Offstream Storage (GOSS) embankment is part of the Bowen Broken Rivers Water Supply Scheme, which includes Eungella Dam, Bowen River Weir. Water is harvested during flood periods and released back to the weir to meet water demands. In 2017, the site was damaged by Cyclone Debbie. Along the majority of the damaged section, the rock protection has moved downgradient within the storage forming a bench, with sliding enabled by the surface provided by the geofabric installed directly onto the embankment. This fabric has been rolled as a result of wave action, leaving the embankment material directly exposed to the waves. Within the damaged zone, limited notching of the embankment material has occurred. In the northeast corner of the embankment, the notching is significant with the embankment having been removed by wave action to the inner wheel track of the crest roadway, marginally reducing the width of the embankment at a few locations. Remedial works have been identified and planned under project 17BBR02. Sunwater has scheduled re-armouring works of a 1,400m length of the storage inner wall in 2019. Until these works are completed, the storage is being operated at a reduced level.

Options Assessment

An April 2018 memorandum describes the repair works for the damaged sections and the options considered. The options included:

- Option 1 - Like for like replacement (geofabric, sand and gravel);
- Option 2 – ArmorMax (turf reinforced and anchored mats);
- Option 3 – Dumped rock riprap (bedding layer with stones and rock fragments dumped in place on top);
- Option 4 – Other solutions (grass, soil cement, gabion, etc.).

Option 3 was the preferred option using sand and gravel bedding. Assessment of costs and other decision making factors were not included in the memorandum. It appears the decision was made on high level pros and cons.

Implementation

A project scoping document for the options study was completed in May 2016. There doesn't appear to have been any work progress until March 2018, when the Annual Inspection Report was completed which included a recommendation for upstream slope protection for an estimated cost of $600,000.

In April 2018, the options assessment memorandum was submitted. A July 2018 technical specifications provides the design and construction requirements for the preferred solution of rock riprap. Design drawings were completed in August 2018.

Meeting minutes from October 2018 summarize the evaluation of the contractor bids received from [redacted] and [redacted]. [redacted] were selected as the preferred bidder based on better hourly rates and cheaper mob/demob costs. A November 2018 Contractor Determination document identifies a contract value of $478,480 plus a 10% contingency of $48,000. The intent of the document is to nominate the contractor as principal contractor (as opposed to Sunwater).

The CAPEX claim in FY19 is $586,391. This allows for approximately $60,000 in Sunwater costs (10%) for project management and any other indirect costs. This may be prudent as Sunwater have nominated the contractor to be the principal contractor. The project costs are within the original budget estimate and the project used a competitive tender process for the contractor. For these reasons, the costs appear to be reasonable.

Findings

- Prudency:

  The Gattonvale Offstream Storage forms a critical part of the Bowen Broken Rivers Scheme. The embankment structure has experienced significant damage caused by Cyclone Debbie in 2017 and has since been operating at a reduced storage level. Access to the GOSS has also been impacted, with the erosion extending to the inner track. Based on the importance of the GOSS within Sunwater's Bowen Basin Scheme and the extent of damaging to the embankment, this project is considered prudent.

- Efficiency:

  The project included a high level options analysis, and high quality technical specifications were prepared based on the preferred option. A high level original budget of $600,000 was set but no documentation was included to support it. The project underwent a competitive procurement process with two bids received. The project will be delivered with the contractor as principal contractor; therefore, Sunwater non-direct costs are expected to be low. The total planned CAPEX cost in FY19 is within the original budget and appears reasonable.

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18BDK06 – Installation of Transformer 12 – Burdekin Falls Dam

Project Overview

Transformer 12 at Burdekin Falls Dam is proposed to be replaced in FY19 as part of Sunwater's forward planning renewals.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19: $123,706
			Standard	✓	Impact of findings on claim ($FY19): $0
			Cost	✓	Total Accepted ($FY19): FY19: $123,706

Background

Burdekin Falls Dam Caravan Park and Dam facilities are powered via two Transformers TX11 and TX12. The transformers are 11KV/415V 300KVA and pad mount types. Transformer 11 (TX11) is suppling power to Housing, Office, Workshop, and Caravan park and entertainment area. Transformer 12 (TX12) is located near Dam Crest and it is suppling power to Dam facilities.

The transformers are required to maintain operation of the Burdekin Falls Dam Caravan Park and Dam facilities. An emergency generator is located in the Burdekin Falls Dam intake Structure which is providing back up power to dam facilities during a power outage. This generator can supply power to dam facilities via the Main Switchboard in case Transformer TX12 fails, but the emergency generator is a secondary and costly means of supply and it is not reliable source of energy for a long period of time.

A needs analysis was completed, and each of the compliance/standard requirements were identified as justification for the works, each associated with unplanned and length service interruption from breakdown of the transformer. The transformer enclosure is also badly corroded and unprotected putting the public safety at risk. Lastly, it is unbunded therefore presents an oil leak risk.

The transformers were manufactured in 1980 and 1979. At the time of proposed replacement, the transformers will be approximately 40 years old, which is beyond the standard serviceable life of electrical equipment (per WSA 03 Section 1.2.6). Images of the transformers demonstrate their poor condition. Based on the condition of the transformers, immediate replacement is justified.

Options Assessment

A detailed options analysis was completed for the Burdekin Falls Dam Power Transformers. Four options were identified in the scoping phase. These include:

1. Refurbishment and upgrade transformers;
2. Replace transformers;
3. Refurbishment of transformers at site;
4. Do nothing.

The preferred option was determined to be Option 2 as it scored the best compared to the options considered based on addressing the needs of the project, net cost, benefits, and risks. The preferred option, to replace the transformers, provided the most cost benefit. An additional 20 years' service was identified compared to the next closest option which was refurbishing the transformers.

Based on the current condition of transformers if no preventative maintenance is undertaken, the transformers are going to break down and the Burdekin Haughton Water Supply Scheme will be disturbed. The consequences of not proceeding may be anything from regular inspections, oil test and analysis to transformer failure that requires transformer replacement. The lead time to supply new transformer is above 20 weeks.

Implementation

The project (18BDK06) for transformer TX12 was executed in combination with project 18BDK07 for transformer TX11. This included project planning, design and project management. The original budget for both projects was $340,595 as per the February 2018 Project Management Plan.

Two offerors were invited to submit a quote for the supply and delivery of two substations to Burdekin Falls Dam. A quote was only received from [redacted] for a price of $78,000. The installation was awarded to [redacted], but no evidence of competitive tender was provided. Both quotes were within the project budget.

A June 2018 cost estimate showed an original budget of $175,508 for 18BDK06. The FY18 costs were $24,734 (as of April 2018). The forecasted requirement for FY19 was $126,766. The total budget would therefore be $151,500.

The proposed CAPEX claim of $123,706 appears to be reasonable for the scope of the project (TX12 only) and the June 2018 cost estimate.

Findings

- Prudency:

  Sufficient information was provided to demonstrate project prudency. The two transformers at Burdekin Falls Dam are critical to the operation of the Caravan Park and Dam facilities. Power is supplied by these transformers to Housing, Office, Workshop, Caravan Park, entertainment area, and dam facilities. The transformers were observed as being improperly maintained and subsequently in poor condition, requiring replacement. The replacement is justified to ensure compliance with the Resource Operations Licence.

- Efficiency:

  A defined project scope has been provided and a detailed options analysis was undertaken. The cost estimate in the Project Management Plan was detailed. While an attempt at competitive procurement was made, it appears only one quote per scope item were received. That said, the quotes were within the allocated budget. The project cost has been considered reasonable.

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19BBR05 – Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)

Project Overview

This project involves the replacement of the compost toilet block at Eungella Dam, which was recently destroyed by fire.

Summary of Findings

Review Summary					
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19)	FY19: $229,340
		Standard	✓	Impact of findings on claim ($FY19)	FY19: $0
		Cost	✓	Total Accepted ($FY19)	FY19: $229,340

Background

Toilet Block 1 is a compost system that is part of the amenities at Eungella Dam. It was installed in 1993 and was last valuated in 2008. In 2018, it was totally destroyed by a fire and subsequently requires replacement to restore amenity to the area. The toilet facilities are necessary to provide sanitation. This project addresses compliance obligations regarding safety with respect to hygiene and basic health. The most recent condition assessment of the asset was completed in 2018. The toilet facility was given the worst possible rating of 6, which reflects the destroyed state that it is in as a result of fire.

Options Assessment

No alternatives were identified. There is no evidence that a scoping process was undertaken. Various toilet technology options are available, and a do-nothing option should still be considered as a non-capex consideration. The consequences of not proceeding would form part of the justification for progressing with the toilet block replacement.

Implementation

According to asset information in the document QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx, the replacement cost for the toilet block based on its 2008 valuation is $186,529 plus $1,374 for the greywater pump. In $FY19 this is $236,952.

Findings

- Prudency:

  Toilet Block 1 at Eungella Dam was completely destroyed by fire in 2018. This project was initiated to replace the toilet block and restore the area's amenity. Given the importance of toilet facilities for general health and wellbeing, including proper sanitation, the project is considered to be prudent. Sunwater need to clarify the anticipated expenditure date for this project as FY19 is now complete and no planning or design documentation was provided.

- Efficiency:

  For the proposed toilet block replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost of the project is close to the asset register replacement value and is therefore considered reasonable.

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19BBR09 – Refurbish Pump 1 - Gattonvale PSTN

Project Overview

Pump 1 at Gattonvale Pump Station is proposed to be refurbished in FY19 and every 6 years thereafter.

Summary of Findings

Review Summary

Prudent	×
Scope	✓
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY19-20: $70,000 FY21-24: $0 FY25-53: $451,000
Impact of findings on claim ($FY19)	FY19-20: $70,000 FY21-24: +$10,000 FY25-53: $411,000
Total Accepted ($FY19)	FY19-20: $0 FY21-24: $10,000 FY25-53: $40,000

Background

The model C3531/985 Flygt pump (620mm) at Gattonvale Pump Station was installed in 2005. It is proposed this pump, Pump 1, is refurbished in FY19, then every 6 years thereafter. The cost per refurbishment ranges from $70,000 to $93,000 in $FY19.

Options Assessment

No alternatives were identified.

Implementation

The pump is considered a low risk asset according to the risk register. Based on this, the replacement cycle for a submersible pump (from QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls) is 30 years and the refurbishment cycle is 6 years.

The proposed 6-year cycle matches the asset management strategy, but it appears it has not accounted for replacement cycles (i.e., refurbishments should occur 6 year cycles from the replacement year). If the pump was installed in 2005, the refurbishments should occur in 2011, 2017, 2023, etc. The proposed schedule has it occurring in 2019, 2025, etc. (i.e., offset by two years). A previous refurbishment could have been delayed, which caused an offset in the schedule, but no information was provided to show this. Furthermore, the refurbishment cycle should account for 30-year replacement cycle. A pump does not need refurbishment in the year that is replaced. The pump is due for replacement in 2035; therefore, refurbishment would be required in that year and not until 2041.

The proposed cost of refurbishment also does not match the replacement value in the asset register. The cost of refurbishment should be less than that of replacement. The asset register replacement value is $18,378 valued in 2015. In $FY19, this is $19,656. Assuming refurbishment is 50% of the cost of replacement, the cost would be $10,000.

Table 1 provides a comparison of the proposed and a recommended schedule and cost of refurbishment.

Table 1 Refurbishment Program Cost and Frequency ($000 in $FY19)

	Install Year	1	2	3	4	4	5	6	7	Total
Proposed	2005	?	2019	2025	2031	2037	2043	2049		
	Past Cost	Past Cost	$70	$85	$92	$93	$92	$89		$451
Recommended	2005	2011	2017	2023	2029	2035	2041	2047	2053	
	Past Cost	Past Cost	Past Cost	$10	$10	Replace	$10	$10	$10	$50

Based on the table above, a significant adjustment to the CAPEX claim is recommended. Costs have also been shifted into the price path period.

Findings

- Prudency:

  Refurbishment of the pump is justified based on asset management strategy for 6-year refurbishment cycle for a low risk asset. In this regard, the project's prudency is demonstrated; however, the timing of the proposed refurbishments do not align with the install date of the pump. Without information on the date of the last refurbishment, a revised schedule is recommended to match the asset strategy. Furthermore, the replacement cycles were not accounted for in the refurbishment cycle. As such, an unnecessary extra year of refurbishment was included.

- Efficiency:

  A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. The proposed refurbishment costs do no align the replacement costs as documented in the asset register. Three adjustments are recommended – one for the timing of the refurbishments, one for removing a refurbishment close to the year of replacement, and one for the individual cost of a refurbishment.

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19BDK01 – Refurbish Hydraulic System and cylinders - Stage 3

Project Overview

This project involves the refurbishment of the hydraulic cylinders that control the flap gates on the Clare Weir. An options analysis recommended an approach to purchase 29 hydraulic cylinders to increase the number of cylinders that could be swapped out and refurbished each year. The project would then form a 4-5 year rolling program to refurbish the 150 cylinders.

Summary of Findings

Review Summary				
	Prudent	✓	Scope	✓
			Standard	✓
			Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $247,070 FY21-24: $0 FY25-53: $426,370
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $247,070 FY21-24: $0 FY25-53: $426,370

Background

Clare Weir on the Burdekin River at Clare has 150 hydraulically operated flap gates on the weir crest to provide an increased upstream pool level for pump stations of the Burdekin Irrigation Area. Failure to maintain upstream water level at Clare Weir puts Sunwater at risk of breaching their regulatory requirement to manage water under the Burdekin Haughton Bulk Scheme.

Failure events were recorded in 2012 and 2013. Risk and condition assessments of the asset have classified the asset as having an "extreme" risk with the gate seals and cylinders requiring refurbishment to reduce the risk to an acceptable level. The previous failures in 2012 and 2013 have resulted in several hazards identified. These include:

- Failure of the weir;
- Failure of a gate bank;
- Failure of a single gate;
- Unsafe access;
- Oil loss to environment;
- Impairment of fishway function.

This project aims to rectify these hazards. It is proposed that the hydraulic system and cylinders at Clare Weir are refurbished in FY20 for an estimated cost of $252,010 in nominal dollars. This project forms part of a rolling program which was stated to currently be at "Project Phase 4 - Preliminary Design".

Options Assessment

Several options were identified to address the risks, including:

1. Removal of the gates and lowering of the weir;
2. Permanent raising of the weir;
3. Refurbishment of mechanical equipment by a contractor;

4. Refurbishment of mechanical equipment by Sunwater direct management;
5. Do nothing;
6. Addition of PLC and SCADA control to the weir.

The recommended option to proceed with is Option 3, a project to procure 29 hydraulic cylinders to give a total of 36 spare, then swap out a bay of cylinders at a time for refurbishment while also replacing the seals and hoses on each gate in the bay. This leads to a 4-5 year refurbishment program.

Implementation

The June 2016 Options Analysis estimated the capital cost to be $2,555,000 (+/-75%). This included $2,200,000 for the direct supply and install costs.

The January 2019 Scope document only describes the scope for setting up the supply and refurbishment contract. The budget was $30,824. The document does, however, provide some information on the wider program. It states that:

- Stage 1, completed in FY18, involved the replacement of the hydraulic hoses and counter-balance valve on each of the 150 cylinders.
- Stage 2, would be the refurbishment of cylinders for the next several years starting FY20.

A maintenance strategy and proposed design modifications were stated to be in development in FY19 but no supporting information was provided. Furthermore, the project title references a Stage 3 for the CAPEX claim but no information on what Stage 3 represents was provided.

As per the Procurement Process & Rec 2019 March document, a competitive tender was completed in November 2018. Four offers were received, of which three were technically compliant. [redacted] was deemed the preferred contractor. The contract was rates based and no details of the quoted rates were provided. Sunwater estimated an annual contract value of $50k-$150k. The total over four financial years would be $160k-$380k and would vary based on the number of cylinders to be replaced and/or refurbished each year. A budget of $400,000 was allocated but no scope was defined.

The CAPEX claim for the Stage 3 works has two entries:

- $252,010 nominal (FY19$247,070) in 2020
- $907,610 nominal (FY19$426,370) in 2050

The FY20 allowance does not match the budget in the procurement document nor does it match the cost estimate in the Options Analysis. We note that this project has been treated as a rolling program of works (with 19 different stages occurring until FY36, with no consistent project identifier contained in the submission). As there is no documentation to identify what the FY20 works include, the following assumptions are made:

- Based on the asset register replacement value, the cost of a single cylinder is approximately $60,000. Assuming 95% ownership costs, the direct cost is approximately $30,000. 29 new cylinders would therefore be approximately $870,000.
- The Options Analysis recommended a purchase of 29 cylinders and refurbishment of all 150 cylinders for a total direct cost of $2,200,000. Subtracting $870,000 for the purchased cylinders, the refurbishment allocation is approximately $9,000 per cylinder. Adding ownership costs back, it is $17,000 per cylinder.
- The FY20 amount of $252,010 would allow refurbishment for up to 14 cylinders, but there is a restriction of 7 cylinders per year due to the current number of spares. The $252,010, therefore, roughly translates to the purchase of two spares and the refurbishment of seven cylinders.

If this logic is applied, the FY20 costs could be considered reasonable, noting that remaining cylinders are being budgeted for under separate stages of the rolling program.

For the 2050 cost claim, the 30-year refurbishment interval matches the original asset management strategy in the Bulk Water Asset Object Type Strategy document, but it is unclear how the cost is established. It does not correlate with the assumed FY20 refurbishment costs and appears to be insufficient to refurbish all 150 cylinders.

Findings

- Prudency:

  Sufficient information was provided by Sunwater regarding the refurbishment of the flap gates at Clare Weir. The failure history, hazard assessment, and condition inspection inform the need for the project. The refurbishments form part of rolling works to reduce the high level of risk currently identified for the weir to an acceptable level. In this regard, the project's prudency is demonstrated.

- Efficiency:

  For the proposed hydraulic cylinder refurbishments, there is insufficient information provided to comment on project efficiency for Stage 3 of the works alone. However, noting that this project has been treated as a rolling program of works, and given the quality of the options analysis and procurement process, the project costs have been assumed as reasonable.

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19BUN10 – Reinstate 10 refurbed and build & install 10 new shutters at Ben Anderson Barrage

Project Overview

This project involves the refurbishment of ten shutters and manufacture and installation of a further ten shutters at Ben Anderson Barrage. These works are in response to the damages sustained after the 2013 January floods. This includes the 2019 and 2020 works.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY19-20: $686,000
Impact of findings on claim ($FY19)	FY19-20: $133,726
Total Accepted ($FY19)	FY19-20: $552,274

*Note: expenditure claim is inclusive of 2019 and 2020 project samples.

Background

During the January 2013 floods, the Ben Anderson Barrage was severely damaged. Flood water inundated the site causing damage to the entire site infrastructure. This included the collapsible steel shutters, which are designed to collapse when the storage level exceeds 0.3 m above full supply level (FSL). Emergency civil works were commenced to remove 20 shutters to commission the barrage to an operational standard, but more work is required for the shutters under the renewals budget. A rolling program of shutter refurbishment was created. This involved removing 10 shutters, sand blasting, repainting, and replacing failed components, then during the following year's shutdown, they are swapped out for the next 10 shutters. This project forms part of a longer-term annual strategy to restore all 110 shutters. In terms of historical projects; 10 shutters were refurbished in 2015 (project 15BUN08) at a cost of $114,611, 10 shutters refurbished in the following year (project 16BUN04) at a cost of $104,870, and 10 shutters refurbished under project 17BUN08 at a cost of $433,535.

The refurbished shutters have a nominal life of 10 years. The corroded and damaged shutters pose a risk of leakage and loss of water, thus reducing the ability to meet agreed service levels under the Bundaberg Bulk Scheme. This project involves a change in approach to the program by replacing shutters instead of refurbishing. The project is split into two years, each with its own maintenance key.

Options Assessment

Three options were identified as documented in the Business Case for this project. These include:

1. Swap out and refurbish 10 shutters each shut down;
2. Fabricate 10 new shutters and then have 20 shutters ready for swap out;
3. Do nothing.

It was recommended in the Business Case that approval be given for Option 2 to proceed. It includes redesign, fabrication and installation of 10 new shutters and involves the following works:

- Contractor design - investigation and redesign of the shutters;
- Presentation of three price options for the fabrication of the shutters;
- Sunwater to choose the preferred option, based on price, maintainability and expected life;
- Fabrication of 10 new shutters;
- Installation of the 10 new and 10 already refurbished shutters;

- Continued fabrication of 10 new shutters per year and associated installation.

Option 2 is the preferred option for the following reasons:

- It provides a long-term solution to ongoing corrosion;
- It provides a much longer life of each new shutter compared to the remaining life of refurbished shutters. It is expected to receive a 20-year life warranty from the fabricator and an expected 40 to 50-year life of the new shutters, compared to an existing 10-year remaining life of refurbished shutters;
- Fabricating new shutters is not much more expensive that refurbishment but provides twice or more the life;
- The current budget comfortably allows for this option.

A do-nothing option was considered, however disregarded as the consequence of not proceeding would delay the progress of rectifying the corrosion issues which currently affect the shutters. That said, it was also mentioned that the shutters may not be needed pending a resolution regarding the Paradise Dam project in FY19.

Implementation

The Nov 2017 Business Case estimated $439,107 for the fully stainless steel option. The base case of painted mild steel, which is closer to a like-for-like replacement, was $100,000 less.

The March 2018 cost estimate was $461,397 including 10% contingency, $250,000 for ten shutters (including the $100,000 upgrade to stainless steel), $56,000 for design, $24,000 for installation. The estimate references a March 2018 quote from [redacted]

The February 2019 cost estimate was $249,176 including a 5% contingency, and $185,000 for ten shutters, and $11,000 for their design. It is noted that the costs were based on the highest cost option of the stainless steel. If lower cost options are pursued, the total costs should decrease.

The February 2019 Project Scoping and Management Plan includes $249,274 for 8 shutters as a trial. They are not expected to be installed in FY19, so this is for the design and costing of three options (mild steel, partial stainless steel, full stainless steel), and their fabrication.

The work has been sole sourced to [redacted], whom have sole sourced an engineering consultant for the design. [redacted] was the company awarded the existing refurbishment contract, which was originally competitively tendered but only resulted in the one offer from [redacted].

The cost claim in the $383,000 in FY19 and $303,000 in FY20 (both in $FY19). These do not match the business case or cost estimates, and no justification has been included to support the highest costs. It is recommended the $249,274 be allocated for FY19 as budgeted in the February 2019 Project Scoping and Management Plan. A higher cost in FY20 would be required to allow installation of both the new and previously refurbished shutters. The March 2018 cost estimate costed the installation at $25,000. Adding this and another $25,000 for two additional shutters to the $249,274 total, the cost allocated for FY20 appears reasonable. Therefore, adjustments of $133,726 in FY19 and $0 in FY20 are recommended.

Findings

- Prudency:

  Sufficient information was provided by Sunwater regarding the proposed replacement of 20 collapsible steel shutters at Ben Anderson Barrage. Replacement is justified based on the poor condition of the shutters and the criticality of their role in storage capacity within the Bundaberg Bulk Scheme. Replacement reduces the risk posed by a shorter life refurbishment option. In this regard, the project's prudency is demonstrated.

- Efficiency:

  A defined project scope was provided with clear consideration for alternative strategies. The preferred refurbishment option had the highest capital expenditure, however presented project efficiencies which would in turn resulted in least net costs over the project lifetime. Detailed cost estimates, including supplier quotes for the shutters, were provided and appear reasonable. The expenditure cost claim in FY19 was $133,726 higher than the cost estimate without explanation; therefore, an adjustment is proposed.

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19CHW03 – Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir

Project Overview

This project forms the forward planning for a study into the recreational use storage management plan at Chinchilla Weir.

Summary of Findings

Review Summary

Prudent	×	Scope	×
		Standard	×
		Cost	×

Capital expenditure claim ($FY19)	FY19: $75,000
Impact of findings on claim ($FY19)	FY19: $75,000
Total Accepted ($FY19)	FY19: $0

Background

Chinchilla Weir forms a critical part of the Chinchilla Weir Scheme. Sunwater have proposed a study into the development of a recreational use storage management plan for Chinchilla Weir. No documentation or justification was provided, therefore the driver for this project is not clear. There is no linkage to the Chinchilla Weir service levels, or any legislative, compliance, safety, or environmental requirements.

Options Assessment

No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The proposed capital expenditure claim is $75,000 (in $FY19), but there was no supporting information provided to describe the contents or extent of the proposed study that could be used to justify the proposed cost. Information in the asset register on the Chinchilla Weir would not be relevant to the assessment of the proposed cost.

Findings

- Prudency: More information is required from Sunwater regarding recreational use storage within the Chinchilla Weir Scheme. Background information pertaining to the weir was not supplied, nor was justification for recreational use storage. Project prudency is not justified based on the documentation provided.
- Efficiency: For the proposed study for recreational use storage management plan, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. More information is required to assess the project's efficiency.

AECOM Imagine it. Delivered.

19ETO06 – Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - '[redacted] Options Study Review Report' Doc Ref #2242568 Option #4

Project Overview

This project involves the forward planning replacement of the controls system at Victoria Plains Pump Station. The proposed timing of replacement is 2019, and again in 2039, for estimated costs of $180,470 and $327,000 respectively.

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $180,470 FY25-53: $327,000
Impact of findings on claim ($FY19)	FY19-20: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $180,470 FY25-53: $327,000

Background

The Victoria Plains Pump Station discharges into the Victoria Plains Balancing Storage, which feeds the gravity pipelines that service the area. The Victorian Plains Operational System has 129 metered offtakes supplying 76 customers.

A condition and risk assessment was completed in 2016 by [redacted]. The control console, logic control panel, cubicle, and control relay were all assessed with a score of 5, which indicates major deterioration to the point of inoperability. It was noted in the condition assessment that Elpro RTU modules are no longer available on the market, should they need replacing.

The Sunwater asset strategy for control systems equipment is to replace on 15-year intervals based on condition or risk. This is also often driven by technology obsolescence. Sunwater's asset strategy for switchboards is to replace on 35 year intervals. The switchboard and controls equipment were installed in 1989. At the time of proposed replacement in 2019, the equipment will be 30 years old.

The works are necessary to comply with safety requirements. Continuing the operation of the existing switchboard presents a considerable WH&S risk. Furthermore, unplanned shutdown, as a result of electrical or controls failure, would lead to service interruptions and risk not meet agreed service levels. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

An options assessment was completed by [redacted] in July 2017. It was updated by Sunwater in July 2018. Four options were considered in the 2018 R&E Detailed Options Analysis. These include:

1. Base Case - maintaining current operating procedures, infrastructure and maintenance routines;
2. Refurbishment case - refurbishing or replacing all switchboard and control system infrastructure with comparable equipment;
3. Replacement case - replacing all current infrastructure with upgraded equipment suitable to accommodate pump VFDs;
4. Partial replacement - replacing certain deteriorated, critical and failure prone switchboard and control system infrastructure or components with new modern equivalent equipment.

Option 4 was determined to be the best means for achieving the desired outcomes based on the detailed options analysis undertaken. It was also the least cost option at $222,000 (other than the do-nothing option).

A non-capex solution was considered in Option 1, where Sunwater would maintain current operating procedures, infrastructure and maintenance routines. Doing nothing was discounted as it presented the greatest risk, especially in terms of safety because it is not current with modern safety standards.

Implementation

After the 2016 condition inspection, [redacted] was retained to complete an options analysis. Three options were proposed (do nothing, refurbish, replace). An MCA was used to select the preferred option of replacement. In July 2018, Sunwater revised the options analysis by adding a new option for partial replacement. It scored higher and was the new preferred option. It reduced the capital cost from $729,000 to $222,000.

It includes the replacement of:

- Incomer ACB ($15,000);
- Motor management relays ($8,000);
- Starting contactors ($10,000);
- Energy meters ($1,500);
- Light and power distribution board ($7,500);
- Control system ($180,000).

In November 2018, Sunwater prepared a briefing note to recommend yet another alternative and way forward. This was in response to a site visit conducted in October 2018. The new recommendation was to replace the 415V switchboard and distribution board and transfer control function to PLC. The cost was estimated to be $259,353.

Technical specifications were prepared in November 2018 for the controls and switchboard. A procurement plan was written in December 2018, which stated that four suppliers would be approached for quote. A Request for Offer was completed in January 2019, but none of the quotes or bid evaluation was provided.

A March 2019 estimate costed the option at $259,353 (matching the briefing note), but after obtaining a contractor quote (which was 33% higher than budget), the estimate became $332,754.

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value for the control equipment is $175,925 ($188,155 in $FY19).

Findings

- Prudency:

  Sufficient information was provided by Sunwater regarding the proposed replacement of the switchboard at Victoria Plains Pump Station. Replacement of the system could be justified based on the age, condition and risk of the asset having exceeded the typical serviceable life for electrical/SCADA equipment. It is in line with Sunwater's asset strategy, and in this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  A detailed options analysis was undertaken, and the preferred option was identified as being partial replacement of the control system. The options analysis was later revised twice more, essentially returning to the original recommendation of full replacement; although at a lower cost. It appears a competitive procurement process was used. The final cost estimate appears to be reasonable and in line with the asset register's asset replacement value.

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19ETO12 – Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)

Project Overview

This project involves the refurbishment of AVIS Gate, which forms part of Sunwater's strategy of 10 yearly rolling refurbishments. The proposed refurbishment year is 2019 and every 10 years thereafter for an estimated average cost of $38,000 per refurbishment (in $FY19).

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	
		Standard	✓	
		Cost	✓	

Capital expenditure claim ($FY19)	FY19-20: $41,900 FY25-53: $109,260
Impact of findings on claim ($FY19)	FY19-20: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $41,900 FY25-53: $109,260

Background

The Scheme provides irrigation water for customers located within the Sandy Creek catchment and services some 15,000 hectares of irrigated sugar cane. The main artery for the Scheme is Oakenden Main Channel which extends for a distance of 34.8 kilometres and has a carrying capacity of some 553 ML/d. The Scheme utilises a number of various types of assets to regulate the flow in Oakenden Main Channel, 3 sets of overshot gates in the first 10 kilometres and 9 float controlled regulating gates in the remaining 25 kilometres of channel. The location of the gate requiring refurbishment is at 19,180m along Oakenden Main Channel.

This project forms part of Sunwater's strategy of 10 yearly rolling refurbishments. The timing of regulator gate refurbishments is cyclic. After refurbishment or replacement, asset condition decays at an assumed rate (2 condition points over 10 years) until reaching the particular Options trigger score (4) before intervention.

This project addresses compliance obligations. Float controlled channel regulator gate arrangements provide reliable and cost-effective channel regulation. Refurbishment will include:

- Removal, blasting and painting of all external surfaces, protection of all threaded bolt holes from paint intrusion;
- Replacement of bearings and all fixings;
- Reassemble, clean and grease pivot points to reduce WH&S risks associated with routine maintenance activities.

Sunwater's Asset Management Policy (AM01) objectives are to 'manage assets in a sustainable manner to meet Sunwater's business objectives of safeguarding asset integrity and ensure continuing asset serviceability.

The gate has been in service since 1983. It was last refurbished in 1999. At the time of the proposed refurbishment, the gate will be 36 years old. Based on the asset condition score and asset age presented in the Options Study, the gate is due for refurbishment. The proposed timing is in accordance with Sunwater's rolling strategy of 10 year rolling refurbishments.

The last condition assessment was documented in 2013. At the time, the gate was rated as having an overall score of 3, which indicates it is in fair condition. This aligns with the condition deterioration figure provided in the Options Study.

Options Assessment

Several options were considered in the Options Study for Float Regulating Gate Refurbishment Strategy. These include:

a. Existing refurbishment strategy;

b. Patch Paint and Extend Refurbishment Period;

c. Mechanical Overhaul and Extended Refurbishment Period;

d. Run to Failure and Replace.

The preferred strategy for float gate refurbishment was determined to be Option A. In a planning sense, there is little benefit in changing the medium to long-term strategy away from the base case (Option A).

Option D is run to failure, which is the equivalent of doing nothing. Sunwater has recognised that this presents considerable risk in terms of safety, cost and reputation and was subsequently disregarded.

Implementation

The Project Initiation document describes the scope a:

- Blast cleaning of all exterior surfaces;
- Painting in accordance with 'Protective Coating Specification' # 930006;
- The replacement of bearings, fixings and sacrificial anodes as per original design;
- Gates are to be rebalanced and commissioned upon reinstallation in accordance with the appropriate procedure detailed in 'Regulating Gates Balancing Procedure' Doc #1880853;
- Pivots points are to be greased as per manufacturer's specifications;
- Remote grease lines to be installed on all pivot points to reduce WH&S risks associated with routine maintenance activities.

The refurbishment cost was estimated at $41,000 (+/- 15%).

The March 2019 scope document reiterates the same scope and states that work must be done by May 2019.

The March 2019 Procurement Process and Recommendation document shows a budget value of $41,509 and an estimated contract value of $30,000. Two quotes were received ($25,650 and $48,880) and the contract was awarded to [redacted], the least cost bidder.

The average refurbishment cost of $38,000 in the CAPEX claim appears reasonable.

Findings

- Prudency:

  Sufficient information was provided by Sunwater regarding the proposed refurbishment of Regulator Gate 4 of Oakenden Main Channel. Refurbishment is justified based on the 10-year rolling strategy by Sunwater and the latest observed condition of the structure. In this regard, the project's prudency is demonstrated.

- Efficiency:

  A thorough Options Study was undertaken to determine the most appropriate rolling refurbishment strategy for the floating regulator gates in the Oakenden Main Channel. Based on the criteria for assessment, the best strategy was to continue with the existing process. A competitive procurement process was completed, and the preferred contractor was awarded based on least cost and demonstrated ability to complete the works. The CAPEX claims appear to be reasonable and in line with the cost estimates generated.

AECOM Imagine it. Delivered.

19TIN07 Study: 5 Yr Comprehensive Inspection – Tinaroo Falls Dam

Project Overview

The Tinaroo Falls Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2019) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $142,021 FY21-24: $158,014 FY25-53: $875,237
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $142,021 FY21-24: $158,014 FY25-53: $875,237

Background

The Tinaroo Falls Dam is a part of the Mareeba-Dimbulah Bulk Supply Scheme and supplies water for irrigation and urban use. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $168,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY19 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

19UCO03 – Study: 5 Yr Comprehensive Inspection – Leslie Dam

Project Overview

The Leslie Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Jun 2019) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $110,106 FY21-24: $117,670 FY25-53: $650,904
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $110,106 FY21-24: $117,670 FY25-53: $650,904

Background

The Leslie Dam is a part of the Upper Condamine Supply Scheme and supplies water for irrigation, town water supply and industrial use. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;

- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While no information was provided to show how the methodology was applied, the methodology itself appears reasonable. The average study cost of $125,000 is also within range of other 5-Yr Dam Inspection projects.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY22 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

19BYR09– Study: 20 Yr Dam Safety Review – Boondooma Dam

Project Overview

The Boondooma Dam supplies water for irrigation for Boyne River irrigators, Burnett River irrigators, and Tarong Power Station. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2019) as well as a safety review report.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $336,607 FY21-24: $0 FY25-53: $355,420
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $336,607 FY21-24: $0 FY25-53: $355,420

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. The next review is required by 1/6/2019.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the Procurement Process and Recommendation document, an open tender process was adopted with eight contractors invited to provide quote for Dam Safety Reviews at Boondooma Dam, Cania Dam and Fred Haigh Dam.

A cost effectiveness ratio (CER) was determined based on Total Cost / Total of Weighted Score for the quotations provided. The offer with the lowest CER is an indication of the best value for money. The outcome of this assessment was that [redacted] was the preferred supplier.

The contract value for Boondooma Dam Safety Review was recorded as $97,695 but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall project budget, but with a total of $147k allocated to [redacted] and assuming 100% markup for indirects and Sunwater labour, a total budget of approx $300k is estimated. Since the [redacted] proposal at $150k was still much lower than the other 6 bidders, for additional risk contingency, the CAPEX claim of $336,607 appears reasonable.

Findings

- Prudency:

  A dam safety review of Boondooma Dam is required by 01/06/19 and every 20 years thereafter, and is prudent to Sunwater's compliance with the dam safety requirements prescribed in Queenland Dam Safety Management Guidelines (Feb 2002).

- Efficiency:

  While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was $97k but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall budget, but with a total of $147k allocated to [redacted] and assuming 100% markup for indirects and Sunwater labour, a total budget of approx $300k is estimated. Since the [redacted] risk adjusted proposal (at $150k) was still much lower than the other 6 bidders, for additional risk contingency, the CAPEX claim of $336,607 appears reasonable.

AECOM Imagine it. Delivered.

20LOW13 – Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy

Project Overview

This project considers the forward planning for replacement of Pump 2 at Owanyilla Pump Station, which is proposed to be replaced in 2020, then again in 2040, for an approximate cost of $130,000 per.

Summary of Findings

Review Summary					
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $128,000 FY25-53: $134,860
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $128,000 FY25-53: $134,860

Background

The Owanyilla Pump Station forms part of the Lower Mary River Distribution Scheme. It is proposed the 600mm Kelly and Lewis centrifugal pump is refurbished in 2020 and again in 2040 for an estimated cost of $130,000 per refurbishment. The pump was originally installed in 1986. No information was provided on the time of the last refurbishment.

According to the document *QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes*, low risk centrifugal pumps (>150mm) have replacement period of 60 years and a refurbishment period of 15 years. Based on a start-up year of 1986, refurbishments would be scheduled in 2001, 2016, and 2031. Replacement would then by due in 2046; therefore, no refurbishment would occur in that year.

A high-level condition assessment was completed in 2016 for the pump in question. It was given an overall rating of 2, which indicates that it is in good condition. The items assessed include the external coating, surface, bolts, foundation and/or baseplate, pump, casing & gland, and pump unit. It is assumed that due to condition, the refurbishment was not completed in 2016 and instead pushed out to 2020 as per the proposed CAPEX claim. The subsequent planned refurbishment is in 2040, which is inconsistent with the Whole of Life Maintenance Strategy of 15 years; therefore, may need to be brought forward.

The *QCA Information Request A58_All projects supporting documentation* document stated that the pump should be refurbished at the same time as the full train of assets (pump, motor, valve). While this appears reasonable, it is not completely consistent with the Whole of Life Maintenance Strategy, since butterfly valves are to be refurbished in 20-year periods compared to pumps and motors at 15 years. It appears that Sunwater has proposed to push out the 15 year refurb of pumps and motors to 20 years as opposed to bring valve refurbishment forward. That said, it should be driven by condition assessment closer to the planned refurbishment year.

Options Assessment

There were no options scoped as part of the forward planning process. Standard operating procedures and specifications were provided to define the scope of a pump refurbishment.

Implementation

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value of the pump is estimated to be $1,068,149 ($1,142,405 in $FY19). The proposed capital expenditure claim is $130,000, which is approximately 10% of the replacement value and has been considered reasonable for refurbishment cost.

As the pump is due for replacement in 2046, the refurbishment year of 2040 may need to be revisited.

Findings

- Prudency:

  The proposed pump refurbishment timing appears reasonable but is not completely consistent with the whole of life maintenance strategy. It appears Sunwater is proposing to push out the pump refurbishment cycle from 15 to 20 years. A refurbishment was due in FY16 but appears to have been pushed out to FY20. It has been assumed this is due to the favourable condition score in FY16. The proposed refurbishment in 2040 should be coordinated with a planned replacement in 2046.

- Efficiency:

  For the proposed pump replacement, there is insufficient information provided to fully comment on project efficiency. No cost budget estimates were included in the documentation from Sunwater. The asset replacement value of the pump is estimated to be $1,142,405. The proposed capital expenditure claim is $130,000, which is approximately 10% of the replacement value and has been considered reasonable for a refurbishment cost.

AECOM Imagine it. Delivered.

21ETO10 – Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA) Control Equip Option Analysis AM11_G04

Project Overview

This project comprises the replacement of an ultrasonic flowmeter at Oakenden Main Channel Distribution in FY21 for an estimated cost of $159,360.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	
			Standard	✓	
			Cost	×	

Capital expenditure claim ($FY19)	FY21-24: $159,360
Impact of findings on claim ($FY19)	FY21-24: $116,959
Total Accepted ($FY19)	FY21-24: $42,401

Background

It is proposed that the ultrasonic flow meter at 548m chainage along the Oakenden Main Channel Distribution within the Eton Distribution is replaced in FY21 for an estimated cost of $159,000.

Sunwater's strategy for bulk water flow meters per their Overall Strategy Common to all Irrigation Schemes by Object Type is for a portfolio refurbishment based on condition, risk and compliance. Replace at full replacement cost using standard asset lives by object type (typically 20 years).

The flow meter was installed in 1981. At the time of proposed replacement, it will be 40 years old. The flow meter is overdue for replacement. The timing of works are justified based on the asset's age having exceeded the standard run-to-failure life expectancy.

Options Assessment

An options assessment is proposed for FY20. No further information is provided.

Implementation

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost is $2,366 valued in 2015. In $FY19, this is $2,530. The proposed capital expenditure claim is $159,360. There is clearly a discrepancy in the recorded replacement value and actual replacement cost. The size of the flow meter is not identified in the asset register. From the *QCA Information Request A40_Meter replacement supporting information* document, the range of replacement costs for ultrasonic flow meters are $6,934 for a 100mm flow meter up to $42,401 for a 1500mm flow meter. Piping within the Oakenden Main Channel Distribution scheme is listed ranging from 225mm up to 1800mm. Assuming 1500mm, an adjustment of $116,959 is proposed.

Findings

- Prudency:

  Sunwater's Overall Strategy Common to all Irrigations Schemes for bulk water flow meters is for replacement at full replacement cost once entire asset life has been achieved (typically 20 years). Although information pertaining to the condition of the ultrasonic flow meter was not provided, based on asset life of 40 years, this project appears to be complying with Sunwater's Asset Strategy.

- Efficiency:

  For the proposed flow meter replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor have any alternatives yet been identified. There is no basis for the cost estimate and there is insufficient information in the asset register to establish a replacement value. An adjustment is proposed to match a replacement cost estimate for a 1500mm flow meter as costed in the *QCA Information Request A40_Meter replacement supporting information* document.

AECOM Imagine it. Delivered.

22MDA01 – West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)

Project Overview

This project proposes to refurbish the mechanical weed screen on the WB7 pipeline inlet on West Barron Balancing Storage in 2020 and every six years thereafter for an estimated average cost of $48,000 per refurbishment.

Summary of Findings

Review Summary

Prudent	×
Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $47,060 FY21-24: $0 FY25-53: $240,860
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $97,570
Total Accepted ($FY19)	FY19-20: $47,060 FY21-24: $0 FY25-53: $143,290

Background

The rotating weed screen within the West Barron Distribution is proposed to be refurbished in FY20 and every six years thereafter for an estimated average cost of $48,000 (in $FY19).

Per Sunwater's Overall Strategy Common to all Irrigation Schemes, the new strategy suggests that the screens should be patch painted, with minor in-situ repairs every 5 years and replace at 20 years unless condition / material warrants a different approach. The reasoning behind the strategy was that aluminium screens are good for 30 years, whereas galvanised items are only suitable for 10 to 15 years. In essence, the screens should have their life extended with patch painting, although should be replaced when the condition warrants it.

The rotating screen was installed in FY05, therefore its refurbishment schedule aligns with the FY20 refurbishment. The remaining 6-year cycles appear to be consistent with the Whole of Life Maintenance Strategy document, but not the Asset Strategy.

A high-level condition assessment of the screen was completed in 2018. The asset was observed as having failed, with a rating of 6 (the worst score in Sunwater's condition rating system). Immediate repairs are justified based on this.

The scope includes:

- Strip and clean;
- Repair chain tracks and all other metal sections that require replacement or repair,
- Sandblast and paint all components;
- Replace carrier chains and wipers;
- Replace all sprocket and bearings and shafts as required;
- Overhaul hydraulic motor;
- Test run;
- Installation.

Considering the condition of the screen has been rated as failure, as well as the fact it may be nearing a replacement cycle, the FY26 refurbishment cycle may not be needed. On the same principle, of not needing to refurbish during a replacement cycle, the FY44 refurbishment may also not be necessary.

Options Assessment

There were no options scoped as part of the forward planning process. High level options were likely analysed during the development of the asset strategy.

Implementation

Following, the condition inspection in 2018, a Non-Routine Work Initiation Document was completed in December 2018. The document states that works shall be completed before June 30, 2020. The unit was removed from service and a temporary screen put in its place. The cost of refurbishment was estimated at $50,000 (+/- 15%).

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost for the screen is $183,560. The proposed capital expenditure claim under this project on average is $48,000, which is 26% of the replacement cost. The CAPEX claim is within the accuracy bounds of the December 2018 cost estimate and considered reasonable.

Findings

- Prudency:

  Sufficient information was provided by Sunwater regarding the proposed refurbishment of the rotating weed screen. The 6-year refurbishment cycle matches that in the Whole of Life Maintenance Strategy but not the Asset Strategy, which recommends 5 years. The FY20 repairs are further supported by observations in the latest condition assessment which indicates the screen is in the worst possible condition and has reached failure. In this regard, the project's prudency is demonstrated. The 6-year refurbishment cycle does not appear to have accounted for the years when the screen will be replaced (every 20 years pending condition). As such the FY26 and FY44 refurbishments may not be necessary. An adjustment of $97,570 is recommended to remove refurbishment from these years.

- Efficiency:

  The scope of refurbishment appears to be reasonable, but there was insufficient information to assess standard. For example, no documentation showing type of surface preparation or coatings was provided. The cost estimate provided was very high level and the basis for its estimation could not be determined. That said, the CAPEX claim is within the accuracy bounds of the refurbishment cost estimate and appears reasonable.

AECOM Imagine it. Delivered.

24LOW03 – Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)

Project Overview

This project comprises the forward planning for replacement of Switchboard 2, which proposes the asset is replaced in 2024 for an estimated cost of $358,000.

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY21-24: $440,600
Impact of findings on claim ($FY19)	FY21-24: $0
Total Accepted ($FY19)	FY21-24: $440,600

Background

Owanyilla Pump Station forms part of the Lower Mary River Distribution Scheme. It is proposed that the switchboard is replaced in FY23-FY24. The switchboard replacement project comprises of two stages; this project review relates to Stage 2 of the works, for an estimated cost of $440,600 (in $FY19).

A risk rating was completed in 2016 for the switchboard. The outcome was the switchboard has a moderate rating with the highest risk category being Production/Operations. This superseded a desktop risk assessment done in 2009, that assessed it as a high risk rating for WH&S regarding the lack of a window on the cabinet.

A high-level condition assessment was completed for the switchboard in 2017, with the overall rating being 3 which indicates it is in fair condition.

The Sunwater asset strategy (from the *Overall Strategy Common to all Irrigation Schemes by Object Type*) is to replace on 35 year intervals based on condition or risk. The switchboard was installed in 1987. At the time of the proposed replacement, the switchboard will be 37 years old; therefore, on age alone the project is prudent; however, based on risk and condition, the expenditure could be delayed. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

An options assessment is planned for FY20. Based on the information provided, replacement of the switchboard is likely the most appropriate option given the age and condition of the switchboard and compliance with Sunwater's Asset Strategy.

Implementation

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost of the switchboard is estimated to be $962,936 ($1,029,878 in $FY19). The proposed capital expenditure of $224,610 (in $FY19) for Stage 1 and $440,600 (in $FY19) for Stage 2 of the works are together less than the full replacement cost of the asset. If the intention is for full replacement of the switchboard, then the proposed expenditure may be underestimating the funds required to complete the works.

Findings

- Prudency:

  Replacement of the switchboard is justified based on the age of the asset. It will have reached the end of its serviceable life for electrical switchboards. In this regard, the project's prudency is demonstrated; however, based on condition and risk, there is opportunity to delay the project. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed switchboard replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided. The cost estimate was very high level and the basis for its estimation could not be determined. The CAPEX claim (for Stage 1 and Stage 2 works combined) is lower than the asset register's replacement value. Based on this, it is noted that the proposed budget may be underestimated.

AECOM Imagine it. Delivered.

0000001332 – Study: 5yr Dam Comprehensive Inspection – Burdekin Falls Dam

Project Overview

The Burdekin Falls Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 June 2022) and report (due 3 months post completion of inspection). The level of documentation is of a low quality.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $110,027 FY25-53: $719,832
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $0 FY21-24: $110,027 FY25-53: $719,832

Background

The Burdekin Falls Dam is a part of the Burdekin Haughton Bulk Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;

- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $118,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY22 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

0000001060_0000076265 – Study: 20Yr Dam Safety Review – Burdekin Falls Dam

Project Overview

The Burdekin Falls Dam requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Jun 2021) as well as a safety review report. The project is a single project that has been split into two planning orders (0000001060 and 0000076265) for planning, reporting and budgeting purposes.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19-20: $288,540; FY21-24: $0; FY25-53: $298,750
		Standard	✓	Impact of findings on claim ($FY19): FY19-20: $25,325; FY21-24: $0; FY25-53: $0
		Cost	✓	Total Accepted ($FY19): FY19-20: $263,215; FY21-24: $0; FY25-53: $298,750

Background

The Queensland Dam Safety Management Guidelines (QDSMG) states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20-year intervals, providing a copy to the Department of Natural Resources and Mines.

A comprehensive dam safety review for the Burdekin Falls Dam is scheduled to be completed by 1 Jun 2020 to comply with condition DS12 of QDSMG. Sunwater has allocated funding in FY19 and FY20 for a total of $288,540. The following 20-year review has been allocated at $298,750 in FY39-40.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

[redacted] was engaged as a sole supplier to undertake the comprehensive dam safety review based on their previous experience with Burdekin Falls Dam and similar inspections on a suite of other projects. Sunwater have a working relationship with [redacted] and are currently collaborating on the Saddle Dams and Monolith Improvements – Preliminary Design. Based on [redacted]s established knowledge of Burdekin Falls Dam, Sunwater engaged[redacted] for project efficiency.

Based on the September 2018 Briefing Note regarding SOA for Burdekin Falls Dam Safety Review – Sole Supplier, the combined planned/approved budget for FY19 and FY20 was $293,215. The estimated costs under the SOA with [redacted] were $200,000. Hand written mark-ups to the briefing note show an estimated new budget of $263,215, comprised of $230,000 for the dam safety review, $24,215 for project management, and $40,000 for a geotechnical investigation.

The October 2018 [redacted] proposal included a fee of $98,050. It is assumed that the allocation of $230,000 in the briefing note budget not only includes this consultant fee, but also Sunwater labour and indirect costs. The budget of $263,215 appears reasonable.

The capital expenditure claim of $288,540 is $25,325 higher than the budget and doesn't appear to take into account the supposed savings for sole sourcing [redacted]. An adjustment of $25,325 is proposed for FY20 to reflect the revised budget. No adjustments are proposed to the FY39/40 costs since the same cost efficiency (from [redacted]) may not be available at the time.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Jul 2021. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  Sunwater has identified savings with the approach of utilising a sole supplier for the project based on their knowledge and experience with the dam. The savings are reflected in the revised budget, but they are not reflected in the CAPEX claim. An adjustment is recommended for the FY20 year, but not for the future FY39/40 year as the same opportunity for savings may not be available at the time.

0000002872 – Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).

Project Overview

This project is in the forward planning phase with an allowance for a comprehensive dam inspection at Cania Dam which is to be completed every five years for compliance with the *Queensland Dam Safety Management Guidelines – February 2002.* The next inspection is scheduled to be completed by 01/12/19 for an estimated cost of $125,000.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $122,155 FY21-24: $0 FY25-53: $736,437
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $122,155 FY21-24: $0 FY25-53: $736,437

Background

Cania Dam is situated on the Three Moon Creek at AMTD 110.1 km. It is an earth and rockfill embankment dam located approximately 40 km north-west of Monto. The dam was completed in 1982 mainly to supply irrigation water and recharging alluvial aquifers around and downstream of the Township of Moonford under the Three Moon Creek Supply Scheme.

The comprehensive inspection is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a comprehensive inspection in accordance with the Queensland Dam Safety Management Guidelines (Feb 2002) is required to be completed by 01/12/19 and every 5 years thereafter.

Options Assessment

No alternatives evaluated as this project is complying with regulation. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document QCA Information Request *A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;

- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $123,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY19 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

0000004992 – Study: 20 Yr Dam Safety Review – Wuruma Dam

Project Overview

The Wuruma Dam supplies water for irrigation and is used for flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2021) as well as a safety review report.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $328,560 FY21-24: $0 FY25-53: $345,400
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $328,560 FY21-24: $0 FY25-53: $345,400

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20-year intervals, providing a copy to the Department of Natural Resources and Mines. The Dam Safety Condition Schedule – DS12 identifies the last review was completed in 2000. The next review is due 1 June 2021. The subsequent review would be due in FY41.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- existing risk profile specific to each site which may influence the type and number of tasks required for the study;

- updates and changes to dam safety standards and guidelines which may influence the scale of the study;
- other site-specific peculiarities which may influence the task requirements of the study
- locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For the reasons, the capital expenditure claim of $328,560 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 June 2021. The project scope of works will align with the relevant Acts and Guideline.

- Efficiency:

  This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

0000006501 – Study: 20 Yr Dam Safety Review (including anchor pullout test and intrusive inspection) – Eungella Dam

Project Overview

The Eungella Dam requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 October 2020) as well as a safety review report. In addition to these works, an anchor pullout test and intrusive inspection is mentioned. The documentation quality of the aforementioned works is low.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $349,150 FY21-24: $0 FY25-53: $385,180
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $349,150 FY21-24: $0 FY25-53: $385,180

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. Additional works have been included in the title of the project including an anchor pullout test and intrusive inspection however the justification and drivers behind these additional works are not specified in documents provided. T

he Dam Safety Condition Schedule – DS12 identifies the next review is due 1 October 2020. The subsequent review would be due in FY40.

Options Assessment

Options assessments are not relevant to safety reviews.

Implementation

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- existing risk profile specific to each site which may influence the type and number of tasks required for the study;
- updates and changes to dam safety standards and guidelines which may influence the scale of the study;

- other site-specific peculiarities which may influence the task requirements of the study
- locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For the reasons, the capital expenditure claim of $349,150 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 October 2020. The project scope of works will align with the Acts and Guidelines it falls under. There is insufficient information to determine the prudency of the additional works (anchor pullout test and intrusive inspection) and the documentation quality of these works are low.

- Efficiency:

  This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

0000006888 – Study: 5 yr Dam Comprehensive Inspection – Teemburra Dam

Project Overview

The Teemburra Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2020) and report (due 3 months post completion of inspection). The level of documentation is of a low quality.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $76,085 FY25-53: $571,948
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $0 FY21-24: $76,085 FY25-53: $571,948

Background

The Teemburra Dam is a part of the Pioneer River Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $95,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY20 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

0000008908 – Meter Replacement – Upper Condamine (2015 UCO strategy)

Project Overview

The Meter Replacement Program at Upper Condamine involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $39,400 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
	Prudent	✓	Scope	✓
			Standard	✓
			Cost	✓

Capital expenditure claim	FY19-20: $77,690 FY21:24: $153,128 FY25-53: $1,146,412
Impact of findings on claim	FY19-20: $0 FY21:24: $0 FY25-53: $0
Total Accepted	FY19-20: $77,690 FY21:24: $153,128 FY25-53: $1,146,412

Background

The Meter Replacement Program for the Upper Condamine Distribution scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Upper Condamine Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Upper Condamine Scheme is $1,960,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $98,000.

The total average annual capital expenditure claim, in $FY19, is $39,400. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000009475 – Study: 5 yr Dam Comprehensive Inspection – Coolmunda Dam

Project Overview

The Coolmunda Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2021) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $130,258 FY25-53: $801,691
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $0 FY21-24: $130,258 FY25-53: $801,691

Background

The Coolmunda Dam is a part of the Macintyre Brook Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document QCA Information Request *A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $133,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed by December 2021 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

0000014241 – Replace Concrete Lining

Project Overview

This project allows for the replacement of concrete lining for an irrigation channel within the Burdekin Haughton Distribution Scheme. It is proposed that the lining is replaced in FY52 for a forecasted expenditure of $1,320,700 (in $FY19)

Summary of Findings

Review Summary

Prudent	✓

Scope	×
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY25-53: $1,320,700
Impact of findings on claim ($FY19)	FY25-53: $768,369
Total Accepted ($FY19)	FY25-53: $552,331

Background

The Millaroo irrigation channel forms part of the Burdekin Haughton Distribution Scheme. It is proposed that the concrete lining of the channel is replaced in FY52 for an estimated cost of $1,320,700 (in $FY19). The asset's functionality and the quality of water supplied by the pipeline may be compromised due to its age and potential deterioration of the concrete lining. While it has been assumed this project is for the replacement of the lining, the object code CTWK refers to non-structural concrete emplacements.

The Sunwater *Overall Strategy Common to all Irrigation Schemes by Object Type* applies an asset strategy for non-structural concrete emplacements of replacement at 100 years or earlier if condition and risk warrants. For concrete lined channels, the asset strategy is to refurbish/replace bays in 5 year intervals starting in the 40th year, up to asset life of 100 years.

The *QCA Information Request A40_Remaining projects supporting information* spreadsheet states that the Asset Management Strategy only applies to a 30-year outlook and planning items outside this timeframe would default to the Whole of Life Maintenance Strategy. The 30-year outlook from FY20 is FY50. Since the replacement is proposed in FY53, the Whole of Life Maintenance Strategy applies.

The asset risk register rated the concrete lining as moderate risk asset in 2018. The Whole of Life Maintenance Strategy for a moderate risk concrete lined channel is 18-year refurbishment intervals and replacement at 70 years. The maintenance strategy for moderate risk concrete works (object code CTWK) is refurbishment at 53 years.

The asset was constructed in 1952. At the time of proposed replacement in FY52, the concrete lining will be 100 years old which is consistent with the asset strategy from the *Overall Strategy Common to all Irrigation Schemes by Object Type* but is not consistent with the Whole of Life Maintenance Strategy for either concrete lined channels or concrete works.

Although outside the 30-year planning outlook for the asset strategy, its application would still be reasonable. The asset's life indicates the proposed replacement timing would be prudent and could even be brought forward if it were to be planned using the Whole of life Maintenance Strategy. A high-level condition assessment of the concrete lining in 2012 gives an overall rating of 3, which indicates it is in fair condition. Future condition assessments will assist in forecasting the timing of replacement.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

According to the document *QCA Information Request A40_Attachment 1 Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value for the concrete lining is estimated to be $516,429 in 2015. In $FY19, this is $552,331. The proposed capital expenditure claim is $1,320,700, which is more than double the asset register's replacement value.

For this reason, the cost has not been considered efficient. It is likely that the capital expenditure claim has been scoped to include earthworks and/or the synthetic lining of the channel but there is no information to confirm this. An adjustment of $768,369 is recommended to align the capital expenditure claim with the asset register replacement value.

Findings

- Prudency:

  Replacement of the system is justified based on the age of the asset at its proposed replacement year being consistent with the asset strategy. If applying replacement timings from the Whole of Life Maintenance Strategy, it could theoretically be brought forward. Either way, the project is deemed prudent.

- Efficiency:

  For the proposed concrete lining replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. From a high level, it appears that the scope and/or cost of the lining replacement has not been done appropriately since it is significantly higher than the asset register's 2016 valuation. An adjustment of $768,369 (in $FY19) is recommended.

AECOM Imagine it. Delivered.

0000000645 – Replace HV Switchboards

Project Overview

The high voltage switchboards at Tom Fenwick pump station are proposed to be replaced in FY27 for an estimated cost of $538,420 (in $FY19).

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY25-53: $538,420
Impact of findings on claim ($FY19)	FY25-53: $0
Total Accepted ($FY19)	FY25-53: $538,420

Background

Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. It is proposed that the switchboard be replaced in FY27 for an estimated cost of $538,420 in $FY19.

A risk rating was completed in 2009 for the switchboard. The outcome was the switchboard has an extreme risk rating in terms of WH&S related to access to live parts, thermal overload risk, and short-circuiting risks. Sunwater must ensure the switchboard is compliant with safety requirements.

A high-level condition assessment was completed in 2009 which rated the switchboard at level 3, being in overall fair condition. The assessment noted the age of the switchboard and potential that components may not be readily available should they be required. These parts should be refurbished.

The Sunwater asset strategy for electrical switchboards it to replace on 35 year intervals or based on risk or condition. The switchboards at Tom Fenwick Pump Station 1 were installed in 1989. At the time of proposed replacement in 2027, the switchboards will be 38 years old; therefore, replacement could be considered prudent and potentially brought forward considering the assessed risk. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process. Given the age of the switchboard it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The asset register shows a valuation completed in 2015 with a replacement cost of $524,908. In $FY19, this is $561,399. The proposed capital expenditure claim of $538,420 is close to but less than the asset register replacement cost and therefore considered reasonable.

Findings

- Prudency:

  Replacement of the switchboards is justified based on the age of the asset and the 25-year asset strategy for switchboard replacement. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed switchboard replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any

alternatives identified. The proposed capital expenditure claim of $538,420 is close to but less than the asset register replacement cost and therefore considered reasonable.

AECOM Imagine it. Delivered.

0000015210 – Replace Pump No. 2 at Tom Fenwick Pump Station

Project Overview

Pump No. 2 within the Tom Fenwick pump station is proposed to be replaced in FY53 for an estimated cost of $1,902,580 in $FY19.

Summary of Findings

Review Summary					
	Prudent	×	Scope	✓	Capital expenditure claim ($FY19)	FY25-53: $1,902,580
			Standard	✓	Impact of findings on claim ($FY19)	FY25-53: $0
			Cost	✓	Total Accepted ($FY19)	FY25-53: $1,902,580

Background

Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. Pump No. 2 within the pump station is proposed to be replaced in FY53 for an estimated cost of $1,902,580 ($FY19).

A high-level condition assessment was completed in 2015 for Pump No. 2 and it was rated as having an overall condition of 3, which is fair. The mechanical seal was in the worst condition and was rated to be in poor condition, 4.

The Pump No. 2 was rated as a low risk in 2005. In 2016, it was re-rated as moderate. It appears that the 2005 assessment was incorrectly concluded. The Whole of Life Maintenance Strategy for moderate risk centrifugal pumps is to replace at 53 years and refurbish at 13-year intervals.

Pump No. 2 of Tom Fenwick Pump Station was installed in 1992. At the time of the proposed replacement, the pump will be 61 years old, which is more in line with the replacement interval of a low risk centrifugal asset; therefore, the project has been considered prudent but with the potential need to bring the project forward. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

An evaluation of the full replacement cost for the existing Thompson Kelly & Lewis pump at Tom Fenwick Pump Station was last completed in 2015. This value was $2,410,321 (or $2,577,883 in $FY19). The proposed capital expenditure claim of $1,902,580 is less and although considered efficient, it highlights the uncertainty in the Sunwater's methodology for calculating forward renewal costs.

Findings

- Prudency:

  More information is required from Sunwater regarding Tom Fenwick Pump Station and the role it plays within the Burdekin Haughton Distribution. Replacement of the pump is justified based on the age of the asset and Sunwater's Whole of Life Maintenance Strategy for centrifugal pumps. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed pump replacement, there is insufficient information provided to full comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is less than the asset register replacement value and has thus been considered efficient.

AECOM Imagine it. Delivered.

0000015276 – Replace Reduction Gearbox

Project Overview

The reduction gearbox on Pump 5 at Tom Fenwick Pump Station 4/5 is proposed to be replaced under this project.

Summary of Findings

Review Summary					
	Prudent	×	Scope	✓	Capital expenditure claim ($FY19)	FY25-53: $1,067,910
			Standard	✓	Impact of findings on claim ($FY19)	FY25-53: $0
			Cost	✓	Total Accepted ($FY19)	FY25-53: $1,067,910

Background

The Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. The reduction gearbox on Pump 5 is proposed to be replaced in FY27 and FY52 for an estimated cost of $539,000 and $529,000 respectively (in $FY19).

The gearbox was installed in January 1998. At the time of the proposed works in FY27, the asset will be 29 years old. The typical serviceable life of mechanical equipment including pumps and their constituent parts is 20 years (according to WSA 03-2011-3.1 Section 1.2.6).

The gearbox is listed as a low risk asset in the asset risk register. Sunwater's Whole of Life Maintenance Strategy for low risk gearboxes is to replace at 25 years and refurbish halfway through the life at 13 years.

A high-level condition assessment was completed for the gearbox in 2016 with the overall rating being 3 which is fair condition. Depending on the condition of the gearbox in the coming years, and based on the proposed replacement at 29 years instead of 25 years, it may be justified to bring the expenditure forward. The FY52 is scheduled at a 25 year interval from FY27, matching the planned maintenance interval.

That said, the annuities assessment has recommended an increase in useful life for this project. It has recommended a delay of 3 years, which pushes the second renewal from FY52 to outside the review period.

Options Assessment

There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided. There is no evidence that a scoping process was undertaken, although given the age of the gearbox it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

Based on a 2015 valuation of the reduction gearbox at Tom Fenwick Pump Station, the replacement value is documented as $1,570,600. In $FY19, this is $1,679,786. The proposed capital expenditure claim is $539,000 which is a third of the full replacement cost. It is not clear based on the information provided whether the claim will be sufficient to properly replace the reduction gearbox.

Findings

- Prudency:

  More information is required from Sunwater regarding both the gearbox and the Tom Fenwick Pump Station and the role they play within the Burdekin Haughton Distribution. Replacement of the gearbox is justified based on the age of the asset having exceeded the typical serviceable life for mechanical equipment (by 9 years) and the Sunwater Whole of Life Maintenance Strategy replacement interval (by 4 years). In this regard, the prudency is demonstrated; however, the modelling completed for the annuities assessment has recommended an increase in useful life of 3 years. For this reason, the project timing has not been considered prudent.

- Efficiency:

  For the proposed gearbox replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is a third of the value of the asset register replacement cost, which signifies the scope may not have been defined appropriately; however, there is insufficient information to confirm this, therefore it is assumed as efficient.

0000015726 – Replace Pipeline 1352.0 to 4307.0

Project Overview

The section of 710mm diameter HDPE pipeline between chainage 1352 m and 4307 m is proposed to be replaced in FY53 for $1,428,880 ($FY19).

Summary of Findings

Review Summary					
	Prudent	×	Scope	✓	Capital expenditure claim ($FY19)	FY25-53: $1,428,880
			Standard	✓	Impact of findings on claim ($FY19)	FY25-53: $0
			Cost	✓	Total Accepted ($FY19)	FY25-53: $1,428,880

Background

A section of pipeline from chainage 1352 m to 4307 m, which forms part of Clare Irrigation Distribution scheme, is proposed to be replaced in FY53 for an estimated cost of $1,428,880 ($FY19).

The pipeline was constructed in 2001 and would be 52 years old at the time of replacement. Per Sunwater's *Overall Strategy Common to all Irrigation Schemes by Object Type*, the strategy for HDPE pipe is to adopt an asset life of 80 years subject to condition and risk assessment and NPV of pipe leaks on a case by case basis.

In the asset risk register, the pipeline was classified as a low risk asset in 2018. The Whole of Life Maintenance Strategy for low risk HDPE pipe is to replace at 50 years.

The *QCA Information Request A40_Remaining projects supporting information* spreadsheet states that the Asset Management Strategy only applies to a 30-year outlook and planning items outside this timeframe would default to the Whole of Life Maintenance Strategy. The 30-year outlook from FY20 is FY50. Since the replacement is proposed in FY53, the 50-year life would apply, which indicates the proposed replacement timing would be prudent and could even be brought forward several years; however, it is likely that this replacement will be pushed out once the planning item enters the outlook of the Asset Management Strategy. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The asset register 2016 valuation of the pipe estimates the full replacement cost for the pipeline section to be $1,985,427 in $FY15. In $FY19, this is $2,123,451. The proposed capital expenditure claim is $1,428,880, which indicates that only partial replacement of the pipeline is planned. Otherwise, the budget may be underestimated.

Findings

- Prudency:

  More information is required from Sunwater regarding the section of pipeline between 1352 and 4307 m and the role it plays within the Burdekin Haughton Distribution. Replacement of the pipe is justified based on the current Whole of Life Maintenance Strategy and the age of the asset; although in future planning forecasts, it will likely be pushed out. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed pipeline replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The proposed capital expenditure claim is $1,428,880, which is less than the asset register replacement value which although deemed efficient, may indicate that only partial replacement of the pipeline is planned or that the costs may be underestimated.

AECOM Imagine it. Delivered.

0000025738 – Replace Pump at Monduran Pump Station

Project Overview

It is proposed that the existing Pump No 3 at Monduran Pump Station be replaced in FY38 for an estimated cost of $885,770 (in $FY19).

Summary of Findings

Review Summary				
	Prudent	×	Capital expenditure claim ($FY19)	FY25-53: $885,770
	Scope	✓		
	Standard	✓	Impact of findings on claim ($FY19)	FY25-53: $0
	Cost	✓		
			Total Accepted ($FY19)	FY25-53: $885,770

Background

Monduran Pump Station forms part of the Bundaberg Distribution. It is proposed that the existing 900mm Kelly & Lewis pump is replaced in 2038 for an estimated cost of $885,770.

A high-level condition assessment was completed in 2018 for Pump No. 3 and it was rated as having an overall condition of 3, which is fair. The foundation and baseplate were listed as being the worst condition and was rated to be in poor condition, 4.

The asset risk register lists the pump, in 2005, as a low risk asset. The Whole of Life Maintenance Strategy for low risk centrifugal pumps is 60-year replacement intervals and 15 year refurbishment intervals.

The pump at Monduran Pump Station was installed in 1978. At the time of its proposed replacement, the pump will be 60 years old. Replacement of the pump could be justified based on its age in line with the maintenance strategy. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The asset register shows valuation of the pump replacement was completed in 2015. It was determined to have a full replacement cost of $1,335,187. The proposed capital expenditure claim is $885,770, which although is deemed efficient, could also indicate that the scope or costs have been underestimated.

Findings

- Prudency:

  More information is required from Sunwater regarding Monduran Pump Station and the role it plays within the Bundaberg Distribution to confirm its criticality. Replacement of the pump is justified based on the age of the asset having exceeded the typical serviceable life under the Sunwater Whole of Life Maintenance Strategy. In this regard, the project's prudency could be demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed pump replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be

determined. The proposed capital expenditure claim is deemed efficient, but as it is much less than the listed asset replacement value, it could also indicate that the scope and/or costs have been underestimated.

AECOM Imagine it. Delivered.

0000030670 – Replace Pipe From 1535.00 to 5250.74M

Project Overview

The section of pipe between chainage 1535 m to 5250 m in the Isis distribution scheme is proposed to be replaced as part of this project. The pipe is reinforced concrete, 525mm diameter, and built in 1989. It is proposed for replacement in FY50 for a cost of $1,398,550 in $FY19.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY25-53: $1,398,550
Impact of findings on claim ($FY19)	FY25-53: $0
Total Accepted ($FY19)	FY25-53: $1,398,550

Background

The reinforced concrete (RC) pipeline forms part of the Isis Distribution system within the Bundaberg Irrigation Scheme. The section under consideration is between chainage 1535 to 5250 m.

As stated in the Overall Strategy Common to all Irrigation Schemes by Object Type, the former strategy for RC pipes was to replace at full replacement cost at standard asset life of 80 years. Given that RC pipes are typically long lived, and that issues are likely due to rubber risks, a new strategy has been developed. Leaks are proposed to be repaired as required and the asset would adopt a new asset life of 100 years. The replacement is subject to regular condition and risk assessment or NPV on number of pipe leaks verses capital replacement. Higher risk assets such as pipelines subject to pressure and vehicle loadings require more regular condition and risk assessments. NPV will be assessed on a case by case basis for sections of pipelines.

The pipeline has also been considered a low risk asset. The Whole of Life Maintenance strategy for low risk RC pipeline is to replace at 80 years.

The pipeline was installed in 1989, making it 61 years in the proposed replacement year. This is not in line with the asset strategy or the Whole of Life Maintenance Strategy. The replacement should be closer to 2089, therefore the full cost of the project has not been considered prudent.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The full replacement cost for the section of RC pipeline per the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx* is $1,396,823, valued in 2008. In $FY19, this is $1,761,441. The proposed capital expenditure claim of $1,398,550 appears to be reasonable.

Findings

- Prudency:

  More information is required from Sunwater regarding the section of pipe between 1535 and 5250 m and the role it plays within the Bundaberg Distribution to demonstrate its impact on service levels. Replacement of the pipeline is not justified based on the age of the asset being within the typical serviceable life for reinforced concrete pipeline and prior to the asset strategy's replacement interval. The age in FY50 is 61 years. Replacement will be pushed out past the assessment period (FY25-53). In this regard, the project's prudency is not demonstrated, and an adjustment of the full amount is recommended.

- Efficiency:

  For the proposed pipeline replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is less than the asset register replacement value; therefore, it has been considered efficient. That said, the timing of the replacement has not been deemed prudent.

AECOM Imagine it. Delivered.

0000030689 – Replace Common Control System STG I

Project Overview

The common controls system is proposed to be replaced in FY26 and every 15 years thereafter at Don Beattie Pump Station for an estimated cost of $385,960 in FY26 and $398,120 in FY41 (both in $FY19).

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY25-53: $784,080
Impact of findings on claim ($FY19)	FY25-53: $0
Total Accepted ($FY19)	FY25-53: $784,080

Background

Don Beattie Pump Station forms part of the Bundaberg Distribution. There are three stages of the control system replacement project, which is proposed to occur in FY26-FY28, then again in FY41-FY43. This review relates to Stage 1 of the works, occurring in FY26 for an estimated cost of $386,960, then again in FY41 for $398,120 (both in $FY19).

The control system is responsible for the operation of the pumps at Don Beattie Pump Station. Sunwater have a regulatory obligation under the Bundaberg Distribution Scheme to provide a consistent water supply.

Per Sunwater's *Overall Strategy Common to all Irrigation Schemes by Object Type*, the strategy for control systems (including SCADA and related equipment) is to replace the equipment of 15-year intervals or based on condition or risk. The standard serviceable life of SCADA equipment is defined in WSA 03 as also being 15 years, mostly due to rapid technological advancements rendering old equipment obsolete.

The controls system was installed in 1989. At the time of the proposed replacement, the system will be 37 years old. Therefore, the controls system will have exceeded the typical run-to-failure asset life.

The asset risk register rated the common controls as a low risk asset. Its condition was rated at a 1 in 2012. Other components of the communications and control system were rated at varying scores from 1 to 4 in 2016 and 2017.

Replacement of the control system is justified based on its obsolescence as a function of age and technological advancements. Depending on the requirements of Sunwater and the capability of the existing control system to achieve the intended operation of Don Beattie Pump Station, it may be justified to bring forward the proposed expenditure to eliminate possible risk of the system malfunctioning due to its age. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process

Implementation

The asset register replacement cost was valued in 2017 and records the common controls as having a full replacement cost of $1,205,033 ($1,247,447 in $FY19). The proposed capital expenditure ($1,179,500 in $FY19 for the three stages of work for the first replacement occurring over FY26-FY28) is approximately aligned with the listed replacement value.

Findings

- Prudency:

  Replacement of the system is justified based on the age of the asset having exceeded the typical serviceable life for controls equipment. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed common controls system replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was high level and appears based on the asset replacement value, which is reasonable on the basis that this will be reviewed as the project draws nearer.

AECOM Imagine it. Delivered.

0000042132 – Replace Scour Valve 1275.59M

Project Overview

This project comprises the replacement of the scour valve at chainage 1275.59 m along the pipeline within the West Barron Distribution. The proposed replacement year is FY36 for an estimated cost of $119,200 (in $FY19).

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY25-53: $119,200
Impact of findings on claim ($FY19)	FY25-53: $119,200
Total Accepted ($FY19)	FY25-53: $119,200

Background

It is proposed the DN225 scour valve at chainage 1275.59m is replaced in FY36 for an estimated cost of $119,200 in $FY19. This project addresses compliance obligations due to potential failure resulting from aged infrastructure.

The asset risk register, in 2018, classified the asset as low risk. It also lists the scour valve as a sluice valve type. The Whole of Life Maintenance Strategy for low risk sluice gate valves is to refurbish on 13-year intervals and replace at 40 years. In 2013, Sunwater prepared a *Scour & Isolation Valve Replacement Strategy*. The document presents an option study for the replacement of scour valves scheduled to be completed during the pricing period of 2014-2017 across three Sunwater service contracts, but stated it would form the basis for dealing with Sunwater's broader portfolio of scour and isolation valves across al service contracts beyond 2017. The study recommended changing the asset strategy for low risk valves to a run-to-failure strategy.

The valve was installed in 1956. At the time of proposed replacement, the valve will be 80 years old; therefore, the valve will have exceeded the expected run-to-failure asset life of 40 years and would likely have failed.

The latest condition assessment completed for the valve was performed in 2002. At the time, the valve was determined to be in fair condition with an overall rating of 2. Comments from the inspection include that the valve was full of sand, the metal work was rusting, leaking was observed at the top gland, and that rock pitching was good. The valve was noted as being refurbished in 2003, however more details could not be located. Future condition inspections will refine the expected failure year of the valve. For now, the proposed timing could be considered prudent; however, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped specific for this valve as part of the forward planning process; although the *Scour & Isolation Valve Replacement Strategy* completed in 2013 assesses the scheduled refurb/replace strategy vs the run to failure strategy, and recommended run-to-failure for low risk valves based on whole of life costs.

Implementation

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost of the scour valve is $102,343 in

2008. In $FY19, this is $129,058. The capital expenditure claim of $119,200 is close to and less than the asset register replacement value and has therefore been considered reasonable.

Findings

- Prudency:

  The asset strategy is run-to-failure. Failure, and thus replacement, has been estimated at the age of 80 years. Replacement of the valve is therefore justified based on the age of the asset having exceeded the typical serviceable life of 40 years. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

  For the proposed valve replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim of $119,200 is close to and less than the asset register replacement value and has therefore been considered reasonable.

AECOM Imagine it. Delivered.

0000042159 – Replace Pipe Cherry Ck Siphon

Project Overview

The Cherry Creek Siphon, constructed of reinforced concrete pipe, is proposed to be replaced in 2049 for an estimated cost of $6.7M in $FY19.

Summary of Findings

Review Summary					
	Prudent	×	Scope	×	Capital expenditure claim ($FY19)	FY25-53: $6,721,690
			Standard	✓	Impact of findings on claim ($FY19)	FY25-53: $6,721,690
			Cost	✓	Total Accepted ($FY19)	FY25-53: $0

Background

The pipe at Cherry Creek forms part of the Mareeba-Dimbulah Distribution. Replacement of this pipe is forecasted to require replacement in 2049 for a cost of $6,721,690 in $FY19.

According to the document *QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019*, the pipe has a documented start-up date of 30/06/1956. Based on this information, the asset age will be 92 years. As per the *Overall Strategy Common to all Irrigation Schemes by Object Type*, Sunwater's previous asset strategy for reinforced concrete pipes was to replace at 80 years. They have revised the strategy to adopt a 100 year life subject to regular condition and risk assessments. The cost of repairing pipe leaks vs capital replacement would be regularly assessed.

The most recent high-level condition assessment of the pipeline, in 2002, suggests it is level 2, which is equivalent to good condition. Based on this and the Sunwater decay curve, the replacement should be postponed beyond FY53. Pending future condition assessments, this project has not been deemed prudent to occur in FY49.

Options Assessment

There were no options scoped as part of the forward planning process. Options assessment would occur closer to the implementation year.

Implementation

The pipeline was assessed in 2008 to have a replacement cost of $6,624,567. In $FY19, this is $8.35M. The proposed capital expenditure claim for this project is $6.72M, which is less than the assessed replacement value. No further cost estimate information was provided, so it is reasonably implied that the entire pipeline is not being replaced, but rather a portion equivalent to the capital claim amount. The claim appears to be reasonable, however it may be an underestimation of the replacement value should the entire pipeline need replacing.

Findings

- Prudency:

  Based on the Sunwater asset strategy, the project's timing has not been considered prudent. Based on age along, the project is proposed 8 years too early. Based on the latest condition assessment and the Sunwater decay curve, its replacement year should be beyond FY54. It is recommended to adjust the capital expenditure claim of this project in the FY25-53 period to $0.

- Efficiency:

  For the proposed replacement of Cherry Creek Pipeline, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives documented. The capital expenditure claim amount was less than the asset register's replacement value; therefore, the scope of the project may not have considered full replacement at the same time, which may not be efficient.

AECOM Imagine it. Delivered.

0000042409 – Replace Syn/Lin Chnl 38142.67-40917.1M

Project Overview

A section of channel synthetic lining is proposed to be replaced between chainages 38,142 m and 40,917 m on the Mareeba-Dimbulah Distribution Scheme with investments in FY28 and FY48.

Summary of Findings

Review Summary					
Prudent	✓	Scope	✓	Capital expenditure claim (FY19$)	FY25-53: $1,402,000
		Standard	✓	Impact of findings on claim (FY19$)	FY25-53: $0
		Cost	✓	Total Accepted (FY19$)	FY25-53: $1,402,000

Background

The asset in question forms part of the Mareeba-Dimbulah Distribution Scheme. It was installed in 1998 and will be 30 years old at the time of the proposed project delivery in FY28. Synthetic liner materials may deteriorate when exposed to harsh environmental conditions, which is likely the situation for a distribution channel. The proposed works include replacing the channel lining between chainage 38,142.67 and 40,917.1 m.

Per the Overall Strategy Common to all Irrigation Schemes by Object Type, the existing strategy for synthetic lined channels is to replace at full replacement cost at standard life of 20 years. The new strategy is to extend asset life to 30 years and continue condition-based repairs.

A high-level condition assessment was completed in 2010 for the channel lining. The asset was assessed as being in very poor condition, with a rating of 5. Comments from the inspection note that major sections of the liner are torn and non-functional, partial replacement of liner between distance 400 to 1000 m.

While the proposed replacement year in FY28 is consistent with the asset age at 30 years, but the condition of the asset indicates it should be brought forward. If the FY28 asset replacement is brought forward, then the FY48 replacement year could remain. Otherwise, it should be pushed out to reflect a 30 year replacement interval.

Options Assessment

No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the condition of the liner it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

In *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the channel was valued in 2008 as having a replacement value of $629,823.04 ($794,200 in $FY19). Per the Overall Irrigation Strategy, the full replacement cost of the synthetic lining is justified. The capital expenditure claim of $924,000 (FY19$747,300) in 2028 and $1,327,000 (FY19$654,900) in 2048 appear reasonable.

Findings

- Prudency:

  Sections of the channel lining need to be replaced, as supported by the condition assessment undertaken in 2010. Based on the asset strategy per Sunwater's Overall Strategy Common to all Irrigation Schemes by Object Type, the proposed replacements are justified based on the asset's age and condition; although the FY28 replacement could be brought forward.

- Efficiency:

  For the proposed channel relining, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates or bill of materials were included in the documentation from Sunwater; however, the cost appears reasonable based on the asset register full replacement cost.

AECOM Imagine it. Delivered.

0000045622 – Replace Earth Drain 1845.00-3765.00M

Project Overview

This project comprises the replacement of a section of earth drain within the Mareeba-Dimbulah Distribution between chainage 1845 m and 3765 m. The proposed replacement year is in FY52 for an estimated cost of $340,360 (in $FY19)

Summary of Findings

Review Summary

Prudent	×

Scope	✓
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY25-53: $340,360
Impact of findings on claim ($FY19)	FY25-53: $0
Total Accepted ($FY19)	FY25-53: $340,360

Background

The Mareeba-Dimbulah Distribution contains an earth drain which facilitates drainage for Arriga. It is proposed that this drain is replaced in FY52 for an estimated cost of $340,360 (in $FY19).

The drain is critical earthworks that are critical to Sunwater's flood management protocol. These works address compliance obligations.

Sunwater's strategy according to *Overall Strategy Common to all Irrigation Schemes by Object Type* for desilting of drains or channels is to remove all minor desilting from program and perform under routine maintenance and only include major re-profiling based on condition and risk.

The asset risk register classified the earth drain as low risk asset in 2018. According to the Whole of Life Maintenance Strategy, low risk earth drains are refurbished at 50-year intervals and replaced at 150 years. Sunwater has stated the Whole of Life Maintenance Strategy is applied when the project falls outside the 30-year outlook of the asset management strategy.

The earth drain was installed in 1979. In FY52, it will be 73 years old. This is 77 years earlier than the Whole of Life Maintenance Strategy for replacement. As such, the project has not been deemed prudent and an adjustment of the full amount is recommended.

A high-level condition assessment was completed in 2010. The earth drain was given a rating of 1, which indicates that it is in good condition. The aspects of the drain which were assessed include the drain waterway batter, operational performance, access road surface, and other berm & drain batter.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value of the earth drain is $189,292, valued in 2016. In $FY19, this is $199,465. The proposed capital expenditure claim is $340,360, which is significantly higher than the replacement cost. A major re-profiling of the drain should be less than the full replacement value. Had the project been deemed prudent in timing, an adjustment would have been made based on cost, but the full amount is being adjusted as a result of prudency.

Findings

- Prudency:

  More information is required from Sunwater regarding the section of earth drain between 1845 m and 3765 m and the role it plays within the Mareeba-Dimbulah Distribution. Replacement of the pipeline is not justified based on the age of the asset being within the typical serviceable life for earth drains. In this regard, the project's prudency is not demonstrated, and the full amount is recommended for adjustment.

- Efficiency:

  For the proposed earth drain replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The basis for its estimation could not be determined and was higher than the asset register replacement value. It has not been deemed efficient, but the full amount is already recommended for adjustment by lack of prudency.

AECOM Imagine it. Delivered.

0000048336 – Study: 20Yr Dam Safety Review – Peter Faust Dam

Project Overview

The Peter Faust Dam supplies water for irrigation, urban use and also provides flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Dec 2023) as well as a safety review report.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $349,860 FY25-53: $387,050
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $0 FY21-24: $349,860 FY25-53: $387,050

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- Extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- Existing risk profile specific to each site which may influence the type and number of tasks required for the study;
- Updates and changes to dam safety standards and guidelines which may influence the scale of the study;

- Other site-specific peculiarities which may influence the task requirements of the study
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For these reasons, the capital expenditure claim of $349,860 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Dec 2023. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

0000057410 – Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)

Project Overview

Undermining of Allan Tannock Weir was observed in February 2013. Works to repair the damages observed are proposed to be completed in 2021.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY21-24: $50,800
		Standard	✓	Impact of findings on claim ($FY19): FY21-24: $1,200
		Cost	×	Total Accepted ($FY19): FY21-24: $49,600

Background

The Cunnamulla township receives water supply from the storage at Allan Tannock Weir. An emerging issue at Allan Tannock Weir was raised at the Toowoomba Office during the annual budget meeting. During an inspection when the water levels were lower, it appears that the protection concrete on the upstream side of the sheet piling has been undermined. This project was initiated to repair the weir to its original design, but its scoping was delayed until after the October 2016 5-Yr Dam Safety inspection. After the inspection, the original proposed works were confirmed, and additional works were recommended to unblock the weep holes and reinstate the broken rock mattresses.

Undermining of the weir may worsen to the point of structural failure. Without intervention, it may result in a risk to the long-term water security of Cunnamulla. Immediate works are required to repair the weir to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.

The weir was constructed in 1992. At the time of proposed repair, the weir will be 29 years old. Typically, unreinforced concrete has a design life of 50-100 years, however it was noted that wave action has caused the condition to worsen progressively with time. With the loss of supporting soil, the concrete condition has deteriorated considerably in the time since it was poured.

Site inspection photos adequately represent undermining of the weir and resulting damaged concrete protection.

Options Assessment

There were no options scoped as part of the forward planning process. Based on the information provided and given the project is not proposed to be implemented until 2021, the appropriateness cannot be commented on at this stage.

Implementation

As per the initial planning for this project, provided in the document *Undermining Issues 2013 January*, the cost breakdown for this project is shown in Table 1:

Table 1 Initial Cost Estimate Breakdown ($ Nominal)

Description	Plan Costs
Contractors	$12,000
Internal Labour Transfer	$640
Internal O/head Transfer	$2,288
Materials	$11,680
Plant Equipment & Vehicles	$6,000
Service Charges	$398
Travel & Accommodation	$2,640
TOTAL	$35,646

The draft estimate from the draft scope dated January 2013 detailed the following:

From annual report, Crest Length is 55m long. Therefore 2m*0.5m*55 = 55m3 of rock.

55 cube of rock @ 2650kg/m3 = 146 tonne. Assume [redacted] delivered to site = [redacted]

Hire Rock breaker; break Rock	$1500
Place dumped Rock (3 Days)	$4500
Our Operators (2*4 days)	$8000 (Can do the other works at the same time)
Travel costs	$3000
Accommodation/ TA	$2200
Total	**$30,880**

Add 20% as it's a brown estimate = **$37,000.** **Plugged figures into SAP Order 5135299 - $40,003**

The $40,003 cost will remain till scope and accurate costed estimate is obtained as we will want to add a concrete slurry over the top of the dumped rock

Additional works were identified for the rock mattress repairs:

Our operators (2 x 1 day)	$ 1,000
Move Rocks back into position	$ 1,500
Concrete 4 m^3	$ 4,000
Other materials	$ 2,000
Contingency	$ 1,500
Total	**$ 10,000**

The revised total combined cost estimate is $47,000. This amount comprises $37,000 (in $FY13) and $10,000 (in $FY17). When converted to $FY19 and planned in FY21, the total is $49,600. The CAPEX claim of $50,800 (in $FY19) does not match. A slight adjustment of $1,200 is recommended so that it matches the cost estimates available.

Findings

- Prudency:

  The Allan Tannock weir provides storage of water and supply to the township of Cunnamulla. The rock protection at the weir was designed to protect the sheet piles. Immediate repairs are required to reinstate the rock protection to its original condition to prevent further damage to the sheet piles and overall dam structural integrity. The 5-Yearly Dam Inspection also recommended repairs to the rock mattresses and weep holes.

- Efficiency:

  For the proposed rock protection replacement, unblocking of weep holes, and rock mattress reinstatement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. An adjustment of $1,200 to the CAPEX claim has been made such that it matches the cost estimates provided.

AECOM Imagine it. Delivered.

0000058091 – Study: 20 Yr Dam Safety Review – Cania Dam

Project Overview

The Cania Dam supplies water recharging alluvial aquifers around and downstream of the Township of Moodford as well as providing flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Dec 2019) as well as a safety review report.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19-20: $231,124; FY21-24: $0; FY25-53: $265,510
		Standard	✓	Impact of findings on claim ($FY19): FY19-20: $0; FY21-24: $0; FY25-53: $0
		Cost	✓	Total Accepted ($FY19): FY19-20: $231,124; FY21-24: $0; FY25-53: $265,510

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines.

The Dam Safety Condition Schedule – DS12 states the last safety review was undertaken in May 2001 and the next review is due 1 December 2019, and every 20 years thereafter.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the Procurement Process and Recommendation document, an open tender process was adopted with eight contractors invited to provide quote for Dam Safety Reviews at Boondooma Dam, Cania Dam and Fred Haigh Dam.

A cost effectiveness ratio (CER) was determined based on Total Cost / Total of Weighted Score for the quotations provided. The offer with the lowest CER is an indication of the best value for money. The outcome of this assessment was that [redacted] was the preferred supplier. Their fee was estimated at $209,265 and was within range of the other supplier fees. Sunwater proposed a $30,000 contingency based on potential geotechnical investigations.

The Procurement Process and Recommendation document also referred to a project budget of $348,728, which was stated to be split into $228,889 in FY19 and $119,839 in FY20. The [redacted] fee (inc contingency) of $239,265 is within the allocated budget of $348,728. The budget also allows for Sunwater labour and indirect cost allowances.

The capital expenditure claim is $231,124 in FY19 only. It is assumed that the FY20 cost are under a separate work order that was not provided for review.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Dec 2023. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was $209,265 was within the same range as the other suppliers but the second least cost offer. There was no budget breakdown for the overall budget, but with a total of $239,265 (inc. contingency) allocated to [redacted] and assuming the remainder of the $348,728 budget is for indirects and Sunwater labour, the costs appear reasonable. It is noted that the budget had a budget allocation in FY20 but the CAPEX claim did not include FY20 costs. It is assumed these are under a separate maintenance key, similar to the Burdekin Falls Dam Safety Review project.

AECOM Imagine it. Delivered.

0000064409 – 20 Dam Safety Review – Kroombit Dam

Project Overview

The Kroombit Dam supplies water as part of the Callide Valley Supple Scheme. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2020) as well as a safety review report.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19)	FY19-20: $258,701 FY21-24: $0 FY25-53: $0
			Standard	✓		
			Cost	✓		
					Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
					Total Accepted ($FY19)	FY19-20: $258,701 FY21-24: $0 FY25-53: $0

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. As per the Dam Safety Condition Schedule – DS12, the next report is due 1 June 2020.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

Based on information provided in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- Physical features such as size, construction material, construction method, gated / non-gated spillway, site geology, etc. specific to each site which may influence the scale of the study;
- Existing risk profile specific to each site which may influence the type and number of tasks required for the study;

- Updates and changes to dam safety standards and guidelines which may influence the scale of the study;
- Other site-specific peculiarities which may influence the task requirements of the study;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For these reasons, the capital expenditure claim of $258,701 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works. It is noted that the future 20-Year Dam Safety Review required in FY40 was not included in this project. It is assumed it has been accounted for under a separate work order.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 June 2020. The project scope of works will align with the relevant Acts and Guidelines. It is noted that the future 20-Year Dam Safety Review required in FY40 was not included in this project. It is assumed it has been accounted for under a separate work order.

- Efficiency:

  This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

0000064557 – Study: 5 Yr Dam Comprehensive Inspection – Kinchant Dam

Project Overview

The Kinchant Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2023) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	
		Standard	✓	
		Cost	✓	

Capital expenditure claim ($FY19)	FY19-20: $0 FY21-24: $132,825 FY25-53: $848,409
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $0 FY21-24: $132,825 FY25-53: $848,409

Background

The Kinchant Dam is a part of the Eton Bulk Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater's *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of $140,000 ($FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

  This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed by December 2023 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

  The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

AECOM Imagine it. Delivered.

0000064960 – Replace Control Equipment

Project Overview

The crane control equipment at Leslie Dam has reached the end of its serviceable life and is scheduled to be replaced under this project.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY21-24: $154,440; FY25-53: $167,250
			Standard	✓	
			Cost	✓	Impact of findings on claim ($FY19): FY21-24: $0; FY25-53: $0
					Total Accepted ($FY19): FY21-24: $154,440; FY25-53: $167,250

Background

Leslie Dam forms part of the Upper Condamine Scheme. It is proposed that the crane control equipment at Leslie Dam is replaced in 2024 for an estimated cost of approximately $160,000.

According to Sunwater's Overall Strategy Common to all Bulk Water Schemes by Object Type, cranes are considered under Sunwater's Existing Developed Strategies. The crane was acquired in 1985. The typical serviceable life for electrical and mechanical equipment as defined in WSA 03 (Section 1.2.6) is 15 and 20 years respectively. At the time of the proposed replacement, the crane will be 39 years old and will have exceeded the standard run-to-failure asset life expectancy. This is also in accordance with Sunwater's existing strategy. A high-level condition assessment completed in 2019 indicates the gantry crane switchboard internal components is in overall condition of 3, which is fair, with some components rated 4 indicating some aspects are in poor condition.

Options Assessment

An options assessment was not completed for this project. There is no evidence that a scoping process was undertaken, although given the age of the crane and control equipment it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

Information provided in QCA Information Request A40_Attachment1_asset Register Including Condition and Risk as at 5 June 2019.xlsx does not identify a replacement cost for the control equipment at Leslie Dam. However, replacement costs for similar items in the register indicate figures between $115,000 and $200,000 are likely. Therefore, the proposed expenditure of $161,000 appears reasonable.

Findings

- Prudency:

  Sufficient information has been provided in regard to the proposed replacement of control equipment at Leslie Dam. Replacement of the equipment is justified based on the age of the asset having exceeded the typical serviceable life for mechanical/electrical equipment. Sunwater's Existing Strategy for Crane Equipment is supported by their Overall Strategy Common to all Bulk Water Schemes by Object Type. In this regard, the project's prudency is demonstrated.

- Efficiency:

  For the proposed crane control equipment replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be determined. That said, the $160,000 replacement cost appears to be close to replacement costs for similar assets.

AECOM Imagine it. Delivered.

0000065102 – Meter Replacement – Three Moon Creek

Project Overview

The Meter Replacement Program at Three Moon Creek involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $44,200 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19-20: $82,339; FY21:24: $161,371; FY25-53: $1,196,720
		Standard	✓	
		Cost	✓	
				Impact of findings on claim ($FY19): FY19-20: $0; FY21:24: $0; FY25-53: $0
				Total Accepted ($FY19): FY19-20: $82,339; FY21:24: $161,371; FY25-53: $1,196,720

Background

The Meter Replacement Program for the Three Moon Creek scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Three Moon Creek Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Three Moon Creek Scheme is $1,046,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $53,000.

The total average annual capital expenditure claim, in $FY19, is $44,200. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000065103 – Meter Replacement – Dawsons Valley

Project Overview

The Meter Replacement Program at Dawsons Valley involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at an average annual cost of $89,100 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY19-20: $85,257 FY21:24: $327,074 FY25-53: $2,467,445
Impact of findings on claim ($FY19)	FY19-20: $33,257 FY21:24: $119,074 FY25-53: $959,445
Total Accepted ($FY19)	FY19-20: $52,000 FY21:24: $208,000 FY25-53: $1,508,000

Background

The Meter Replacement Program for the Dawsons River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Dawsons River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Dawsons River Scheme is $1,040,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $52,000.

The total average annual capital expenditure claim, in $FY19, is $89,100. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has been overstated by $27,100. As such, the reasonable value is considered to be $52,000.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method has overstated costs compared to the cost of summing the replacement costs for each meter in the scheme. As such, adjustments are proposed to lower the annual budget to $52,000 ($FY19).

AECOM Imagine it. Delivered.

0000065104 – Meter Replacement – Callide Valley

Project Overview

The Meter Replacement Program at Callide Valley involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $66,500 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19-20: $124,207; FY21:24: $244,339; FY25-53: $1,846,180
		Standard	✓	Impact of findings on claim ($FY19): FY19-20: $0; FY21:24: $0; FY25-53: $0
		Cost	✓	Total Accepted ($FY19): FY19-20: $124,207; FY21:24: $244,339; FY25-53: $1,846,180

Background

The Meter Replacement Program for the Callide Valley scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Callide Valley Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Callide Valley Scheme is $ 1,560,837. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $79,000.

The total average annual capital expenditure claim, in $FY19, is $66,500. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000065145 – Meter Replacement – Proserpine River

Project Overview

The Meter Replacement Program at Proserpine River involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $35,940 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19)	FY19-20: $63,602 FY21:24: $125,205 FY25-53: $959,476
			Standard	✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21:24: $0 FY25-53: $0
			Cost	✓	Total Accepted ($FY19)	FY19-20: $63,602 FY21:24: $125,205 FY25-53: $959,476

Background

The Meter Replacement Program for the Proserpine River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Proserpine River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Proserpine River Scheme is $1,190,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $60,000.

The total average annual capital expenditure claim, in $FY19, is $35,940. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000065147 – Meter Replacement – Macintyre Brook (strategy for IBT as developed in 2015)

Project Overview

The Meter Replacement Program at Macintyre Brook involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $22,600 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY19-20: $45,527; FY21:24: $89,730; FY25-53: $655,387
		Standard	✓	
		Cost	✓	Impact of findings on claim ($FY19): FY19-20: $0; FY21:24: $0; FY25-53: $0
				Total Accepted ($FY19): FY19-20: $45,527; FY21:24: $89,730; FY25-53: $655,387

Background

The Meter Replacement Program for the Macintyre Brook scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Macintyre Brook Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Macintyre Brook Scheme is $931,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $47,000.

The total average annual capital expenditure claim, in $FY19, is $22,600. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000065148 – Meter Replacement – Chinchilla Meter Outlets (2015 IBH strategy)

Project Overview

The Meter Replacement Program at Chinchilla involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $11,400 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
	Prudent ✓	Scope ✓	Capital expenditure claim ($FY19)	FY19-20: $22,914 FY21:24: $45,148 FY25-53: $329,751
		Standard ✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21:24: $0 FY25-53: $0
		Cost ✓	Total Accepted ($FY19)	FY19-20: $22,914 FY21:24: $45,148 FY25-53: $329,751

Background

The Meter Replacement Program for the Chinchilla scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Chinchilla Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Chinchilla Scheme is $523,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $27,000.

The total average annual capital expenditure claim, in $FY19, is $11,400. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000072774 – Stabilise bed and banks of the spillway discharge channel subject to dam safety review

Project Overview

This project proposes to stabilise the bed and banks of the spillway discharge channel at Teemburra Dam.

Summary of Findings

Review Summary				
	Prudent ×	Scope ×	Capital expenditure claim ($FY19)	FY21-24: $350,900 FY25:53: $292,708
		Standard ×		
		Cost ×	Impact of findings on claim ($FY19)	FY21-24: $350,900 FY25:53: $292,708
			Total Accepted ($FY19)	FY21-24: $350,900 FY25:53: $292,708

Background

Teemburra Dam supplies water to the Pioneer Valley irrigation system and for urban and industrial purposes in the region. The Teemburra Dam is assessed as having an Incremental Flood Consequence Category (IFCC) rating of extreme based on major damage. It is proposed that the bed and banks of the spillway discharge channel are stabilised in 2024 for an estimated cost of $350,000 ($FY19) and in 2049 for a cost of $272,000 ($FY19).

The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.

Options Assessment

No alternatives were identified.

Implementation

Sunwater's existing strategy for dam and structural components including the bed and banks of the spillway discharge was to replace on an 80 to 200-year interval based on condition, risk and object type. Under Sunwater's new strategy, the assets are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. The most recent dam safety inspection did not appear to support the need for this project.

Findings

- Prudency:

  The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.

- Efficiency:

  There is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified, nor cost estimates provided.

AECOM Imagine it. Delivered.

0000073006 – Kinchant Dam - Refurbish - Inlet Tower Upgrade - Stage III - Fabrication, Installation of Modifications (Tier 2)

Project Overview

Major refurbishment works to strengthen the tall slender tower against earthquake damage at Kinchant Dam have been identified for completion is 2022 for an estimated cost of $305,120.

Summary of Findings

Review Summary				
Prudent	×	Scope	✓	Capital expenditure claim ($FY19): FY21-24: $285,450
		Standard	✓	Impact of findings on claim ($FY19): FY21-24: $285,450
		Cost	✓	Total Accepted ($FY19): FY21-24: $0

Background

It is proposed that refurbishment works to the Kinchant Dam inlet tower be done in 2022 for an estimated cost of $285,450 ($FY19). The works involve a major refurbishment to strengthen (post tensioning) the structure against damage from an earthquake. An Options Study is planned for FY20 so no other documentation will be created until the outcome of the Options Study is complete. The project was recommended from the 2000 Dam Safety Review, but the document was not provided to allow confirmation of prudency and scope.

Options Assessment

There were no options scoped as part of the forward planning process but was stated to be planned FY20. The appropriateness cannot be commented on at this stage, based on the information provided.

Implementation

The proposed CAPEX claim is for a single year at a cost of $285,450 ($FY19). The basis for this estimate was not provided but is assumed to be sourced from the Kinchant Dam 2000 Dam Safety Review. There is no replacement value for the tower in the asset register to assess a relative cost for the refurbishment.

The tower was built in 1986 and the asset register condition rating for the tower was good (minor defects only) as assessed in 2012. It is therefore assumed that the project is related to a change in design standard for seismic requirements since the year it was built. At the time of design, AS2121-1979 (Australian Standard for the Design of Earthquake Resistant Buildings) was the main seismic design requirement and the first of kind in Australia. It only applied to various areas of Australia, which Kinchant Dam doesn't appear to have been affected. It is possible that no seismic considerations would have been applied to the 1986 design. After earthworks in 1988 and 1989, a new standard was introduced called AS1170.4-1993, which applied to all regions of Australia. This standard may have been the basis of the recommendation in the 2000 Dam Safety Review report. Revisions to the standard were made in 2002 and 2007, but in 2018 a major change to seismic design requirements was introduced. Australia updated the magnitude of historical earthquakes to more accurately represent their true size based on modern measurement techniques. As a result, hazard design factors have been reduced; therefore, what may have driven the seismic review in 2000 may no longer apply. Before the project can be considered prudent, an appropriate review of seismic requirements should be done.

While a portion of the funds have been stated to be spent in FY20 for an options study, the full CAPEX claim is in FY22. The need for the project was identified in FY00 but the project was scheduled 22 years later. The long delay indicates that the project was not of high priority.

Findings

- Prudency:

  While the tower appears to be in good condition, it appears that the 2000 Dam Safety Review identified unacceptable structural integrity for seismic resistance of the structure. It is assumed that this in response to the updated seismic codes in 1993. The delay in project implementation of 22 years suggest the project was of low priority and did not affect overall risk of the dam. Furthermore, the seismic standards have been updated in 2018 and what may have been prudent in 2000 could have changed. The project has not been considered prudent until an appropriate review of current standards is done.

- Efficiency:

  For the proposed tower refurbishment/strengthening, there is insufficient information provided to commentary on project efficiency as no supporting documentation was provided and no data from the asset register is applicable. It is noted that options study (Stage 1) and design and procurement (Stage 2) are expected to occur in FY20 and FY21 respectively.

AECOM Imagine it. Delivered.

0000076150 – Meter Replacement – Burnett River

Project Overview

The Meter Replacement Program at Burnett River involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $51,700 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	Capital expenditure claim ($FY19)	FY19-20: $102,830 FY21:24: $201,268 FY25-53: $1,474,010
			Standard	✓	Impact of findings on claim ($FY19)	FY19-20: $0 FY21:24: $0 FY25-53: $0
			Cost	✓	Total Accepted ($FY19)	FY19-20: $102,830 FY21:24: $201,268 FY25-53: $1,474,010

Background

The Meter Replacement Program for the Burnett River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract".

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Burnett River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater.

The approximate value of all water meters within the Burnett River Scheme is $1,353,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $68,000.

The total average annual capital expenditure claim, in $FY19, is $51,700. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000076154 – Meter Replacement – Upper Burnett River

Project Overview

The Meter Replacement Program at Upper Burnett involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of $56,800 (in $FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary				
	Prudent	✓	Scope	✓
			Standard	✓
			Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $113,280 FY21:24: $221,808 FY25-53: $1,624,493
Impact of findings on claim ($FY19)	FY19-20: $0 FY21:24: $0 FY25-53: $0
Total Accepted ($FY19)	FY19-20: $113,280 FY21:24: $221,808 FY25-53: $1,624,493

Background

The Meter Replacement Program for the Upper Burnett scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not considered it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced ‘like-for-like’ with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater’s AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer’s specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Upper Burnett River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in $FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Upper Burnett Scheme is is $1,609,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately $81,000.

The total average annual capital expenditure claim, in $FY19, is $57,000. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Findings

- Prudency:

  Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

  The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

AECOM Imagine it. Delivered.

0000076200 & 0000076201 – Refurbish Silverleaf Weir – Stage 1

Project Overview

Silverleaf Weir is part of the Barker Barambah Bulk Supply Scheme and its condition has been deteriorating over time. The latest condition assessment has identified that the elements of the weir are at the failure stage with an estimated remaining life of 2-4 years (from 2018). The outcome of a 2018 Options Study will determine the scope of works for its long term maintenance strategy. This is a single project that is to be delivered across two years.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim ($FY19)	FY19-20: $939,980 FY21-24: $1,861,760
Impact of findings on claim ($FY19)	FY19-20: $0 FY21-24: $0
Total Accepted ($FY19)	FY19-20: $939,980 FY21-24: $1,861,760

Background

The Silverleaf weir was constructed in 1949 and will be 71 years old at the time of proposed renewal. The asset strategy for weirs is to maintain into perpetuity by undertaking periodical refurbishments based on condition and risk. The most recent condition assessment report (Wood and Research Development, 2018) has stated the structure is in poor condition based on severely degraded piles through the structure. The timber elements have reached the failure stage and restoration is needed urgently to prevent weir failure. The report recommended work be undertaken within 6 months (i.e., by January 2019) including posting of the deteriorated piles, diffusing of all timber members, replacement of the backwall boards, replacement of the bracing, treatment of all timber with copper naphthenate or similar, and replacement of vertical fasteners. Overall, the weir was deemed to have an expected remaining life of 2-4 years.

Options Assessment

An options analysis was undertaken in 2010 but was considered to be out of date and was not used for this project. The Non Routine Work Initiation Justification Document (2017) specifies that the following options are to be considered as a minimum for the 2018 options analysis.

1. Do nothing;
2. Upgrade the weir;
3. Rebuild the weir;
4. Refurbish / replace certain components of the weir; and
5. Decommission the weir.

The 2018 options analysis was not provided and the proposed option has not been provided.

Implementation

The condition of the weir has been deteriorating with time. Condition assessments were completed in 2015, as report in the asset register, with the majority of components being rated as 4 (poor). Some concrete components and select other components were scored as 2 (minor defects only). The Non Routine Work Initiation Justification Document (2017) recommended a two stage approach to planning. First, a 5 yearly comprehensive assessment (i.e. condition inspection) should be carried out. Second, an options analysis be done to determine an appropriate whole-of-life strategy for the weir.

The condition inspection was carried out in 2018 by Wood and Research Development. The report recommended urgent restoration to prevent a weir failure. It estimated a remaining life of 2-4 years (i.e., by 2020-2022).

The options analysis was supposedly completed in FY18, but no documentation was provided.

The design and construction phase has been scheduled over three stages in FY20, FY21 and FY22 with costs of $939,980 and $1,862,000 and $468,950 respectively (this review relates to Stage 1 and Stage 2 works only). The total combined cost of all three stages is $3,270,930. The QCA Information Request A40_refurbish Silverleaf Weir supporting information document states that the cost estimate was based on a similar restoration to Whetstone Weir in FY10 and was scaled up in consideration of size, level of decay, locality, and inflation/escalation.

The asset register replacement value for the weir and all its components is $2,523,227 using a 2015 valuation. In $FY19, this is $2,698,692. However, it is noted that not all of the weir components were populated with replacement values.

Findings

- Prudency:

  The project is deemed prudent as it can be reasonably implied there is a safety risk attached to the failure of the Silverleaf Weir and a business need for the safe functioning of the weir. The option has not been chosen yet and the scope of works is to be defined by the 2018 Options Study. It is reasonably implied the scope of works will fulfil regulatory obligations.

- Efficiency:

  Based on the early phase of the project, and prior to options being assessed, there is insufficient information to comment fully on the efficiency of the project. However, the proposed project process indicates the project should result in overall efficiency being delivered on the project. The cost estimate was established by scaling costs from a previous similar weir restoration project. The costs appear to be reasonable in comparison to available replacement values in the asset register.

AECOM Imagine it. Delivered.

24BIA20 – Isis System – Irrigation Common Strategy

Project Overview

The assets forming the Isis Irrigation System are maintained in accordance with the Overall Strategy Common to all Irrigation Schemes by Object Type. This project relates to the refurbishment of concrete lined channels.

Summary of Findings

Review Summary

Prudent	✓

Scope	×
Standard	✓
Cost	×

Capital expenditure claim ($FY19)	FY25-53: $2,578,670
Impact of findings on claim ($FY19)	FY25-53: $1,395,382
Total Accepted ($FY19)	FY25-53: $1,183,284

Background

The Isis irrigation system forms part of the Bundaberg Distribution Scheme. The description of the proposed project appears to be the refurbishment of the Isis system concrete lined channels as part of the Irrigation Common Strategy. The asset register shows six concrete channel sections running from a chainage of 9,682 to 17,923m (i.e. 8.2km). The Isis system also has a portion of unlined earth channel, but based on the title of the project, they are not intended to be included in this refurbishment program.

Options Assessment

There were no options scoped as part of the forward planning process, but this would not be expected until close to the first year of refurbishment in FY29.

Implementation

The refurbishment program is planned on a 5-year cycle starting in FY29. The channel was constructed in 1989. In FY29, the channel will be 40 years old. This timing is consistent with the asset strategy, which states the refurbishment program to start at 40 years and replace and repair bays on a 5-year frequency. The cost of each refurbishment is to be the total replacement cost divided by 60, which relates to the time from start of the refurbishment program to the end of life at 100 years.

The asset register replacement value for the concrete channel linings is $9.38M valued in 2008 (excluding the concrete bench flume). In $FY19, this is $11.8M. Following, the asset strategy budgeting process, the 5-yearly allocation should be $197,214.

The CAPEX claim is for an average refurbishment cost in $FY19 of $430,000. This converts to a total valuation of $25.6M, which is closer to the total replacement value of the channel system when including both the concrete lined and the unlined earth channel portions. The earth channels have a different refurbishment strategy and should not be lumped together. Based on the title of the project, it appears this was not the intention. An adjustment of $1,395,382 ($FY19) should be made to reflect the relevant cost of the concrete linings only.

Findings

- Prudency:

  The start and frequency of the proposed Isis system concrete channel refurbishment program is in line with the asset strategy and is therefore considered prudent.

- Efficiency:

  The cost of each refurbishment appears to have been miscalculated. The asset strategy divides the replacement cost by 60 years to spread the refurbishments and replace and repair bays on a 5-year frequency. The CAPEX claim appears to have included the unlined earth channels in the calculation. As these are managed under a different strategy and presumably a different project, they should be removed from this project. An adjustment of $1,395,382 ($FY19) should be made to reflect the relevant cost of $197,214 per refurbishment for the concrete lined portions only.

AECOM Imagine it. Delivered.

0000076580 – Study: Bathymetric survey of Fairbairn Dam

Project Overview

A bathymetric survey (or similar) is proposed at Fairbairn Dam to identify underwater hazards and increase safe use of the dam for recreational activities.

Summary of Findings

Review Summary					
	Prudent	✓	Scope	✓	
			Standard	✓	
			Cost	✓	

Capital expenditure claim ($FY19)	FY19-20: $286,549
Impact of findings on claim ($FY19)	FY19-20: $0
Total Accepted ($FY19)	FY19-20: $286,549

Background

The Sunwater Executive Leadership Team (ELT) has identified Fairbairn Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to survey (not necessarily limited to bathymetric) the lake to determine accurate depths, features and hazards in the lake that pose a safety risk for the various recreational users. The hazards may change depending on the varying water levels. Identified features within the pondage storage area will subsequently be required to be addressed accordingly in the interest of public safety on the lake. This will presumably be under a separate project.

The expected survey area to be approximately 2000 ha.

Options Assessment

No alternatives were identified. Considering this is a study, there is little to no options scoping possible. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The cost estimate for the survey study per the Non-Routine Work Initiation Justification document as being $317,500 and was costed in 2019. The basis for this estimate is Internal Project Management with an estimate confidence of +/-15%. The claim amount for this study is $292,280 in nominal $, which is within the cost estimate's level of confidence.

Findings

- Prudency:

  Fairbairn Dam is recognised as an area used for public recreation. This project has been initiated to determine accurate depths, features and types of hazards in the lake that pose a risk for the various recreational users. Given the risks these hazards may pose to the public, it is considered prudent for the survey to be completed.

- Efficiency:

  For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency. That said, the CAPEX claim is within the accuracy bound of the cost estimate provided by the Sunwater project manager and appears reasonable for a survey of 2000 ha.

AECOM Imagine it. Delivered.

0000076581 – Study: Bathymetric Survey of Bjelke-Petersen Dam

Project Overview

A bathymetric survey (or similar) is proposed at Bjelke-Petersen Dam to increase safe use of the dam for recreational activities.

Summary of Findings

Review Summary						
	Prudent	✓	Scope	✓	Capital expenditure claim	FY21-24: $46,840
			Standard	✓	Impact of findings on claim	FY21-24: $0
			Cost	✓	Total Accepted	FY21-24: $46,840

Background

The ELT has identified Bjelke-Petersen Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to survey (not necessarily limited to bathymetric) a portion of the lake to determine accurate depths, features and hazards in the lake posing safety risks to the various recreational users. Hazards may change depending on varying water levels. Any identified features within the pondage storage area subsequently would be required to be addressed in the interest of public safety on the lake. It is presumed this would be part of a separate project.

Options Assessment

No alternatives were identified. Considering this is a study, there is little to no options scoping possible. A do-nothing option should still be considered as a non-capex consideration.

Implementation

A basis for the cost estimation was not provided for this project. Given the cost estimation for a similar project at Fairbairn Dam, the capital expenditure claim appears to be reasonable for the survey study. The Fairbairn Dam survey proposed to survey approximately 2000 ha of the roughly 15,000 ha reservoir for a cost of $286,549 ($FY19). Considering the Bjelke-Petersen Dam reservoir covers roughly 2,500 ha (i.e. roughly 6x less than Fairbairn), a scaled version of the survey cost would be $48,000 which is in the range of the proposed CAPEX claim cost.

Findings

- Prudency:

  Bjelke-Petersen Dam is recognised as an area used for public recreation. This project has been initiated to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Given the risks these hazards may pose to the public, it is considered prudent for survey to be completed so that dam-users may use it safely.

- Efficiency:

  For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency. That said, the CAPEX claim, when scaled based on reservoir area, is within the range of a similar survey proposed at the Fairbairn Dam which had a cost estimated associated with it. It is therefore assumed efficient.

AECOM Imagine it. Delivered.

0000077561 – Testing of post tensioning permanent strand anchors

Project Overview

This project involves the testing of post tensioning permanent strand anchors, which is required in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD 2003). The inspection is scheduled for 2027 and every 5 years thereafter.

Summary of Findings

Review Summary				
Prudent	✓	Scope	✓	Capital expenditure claim ($FY19): FY24-53: $673,000
		Standard	✓	Impact of findings on claim ($FY19): FY24-53: $0
		Cost	✓	Total Accepted ($FY19): FY24-53: $673,000

Background

Tinaroo Dam forms part of the Mareeba-Dimbulah Bulk Scheme. Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003).

Five yearly testing is appropriate. However, more frequent tests should be undertaken if the permanent strand anchors show signs of deterioration.

Tinaroo Dam was constructed in 1959. At the time of the testing, it will be 68 years old.

A condition assessment of the spillway anchor prestress system was completed in 2015 in accordance with the five yearly inspection requirements (ANCOLD Guidelines, 2013). The system was rated as being in good to fair condition which supports the continuation of testing at its current schedule.

Options Assessment

Testing is required to meet Dam Safety Requirements. An options analysis is not applicable to this project.

Implementation

The testing of post tensioning permanent strand anchors has been estimated at approximately $105,000 to $120,000 (in $FY19) every five years. It is unclear why each year has a different projected cost, but the costs appear reasonable.

Findings

- Prudency:

  Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003). The previous condition assessment of the asset indicates that the existing inspection schedule is suitable. This project is considered prudent to meet Dam Safety Requirements.

- Efficiency:

  For the proposed testing of post tensioning strand anchors, there is insufficient information provided to comment on project efficiency, but the costs appear reasonable.

Appendix C

Impact on Annuity by Scheme

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Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Appendix C Annuity Adjustment by Scheme

1.0 Total

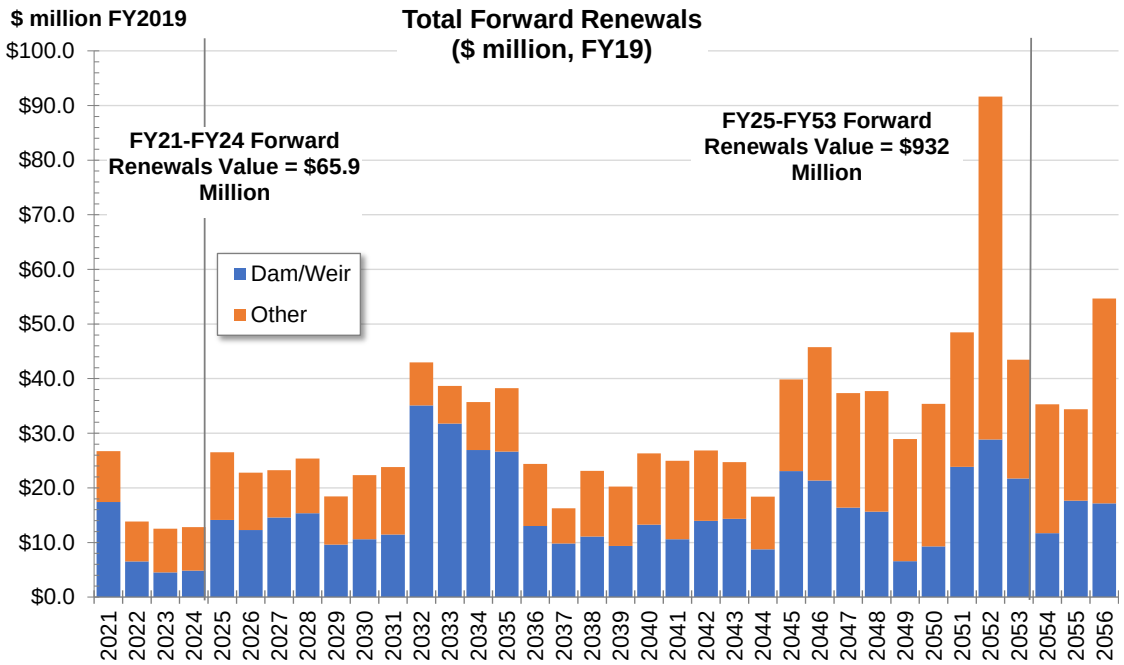

Figure 1

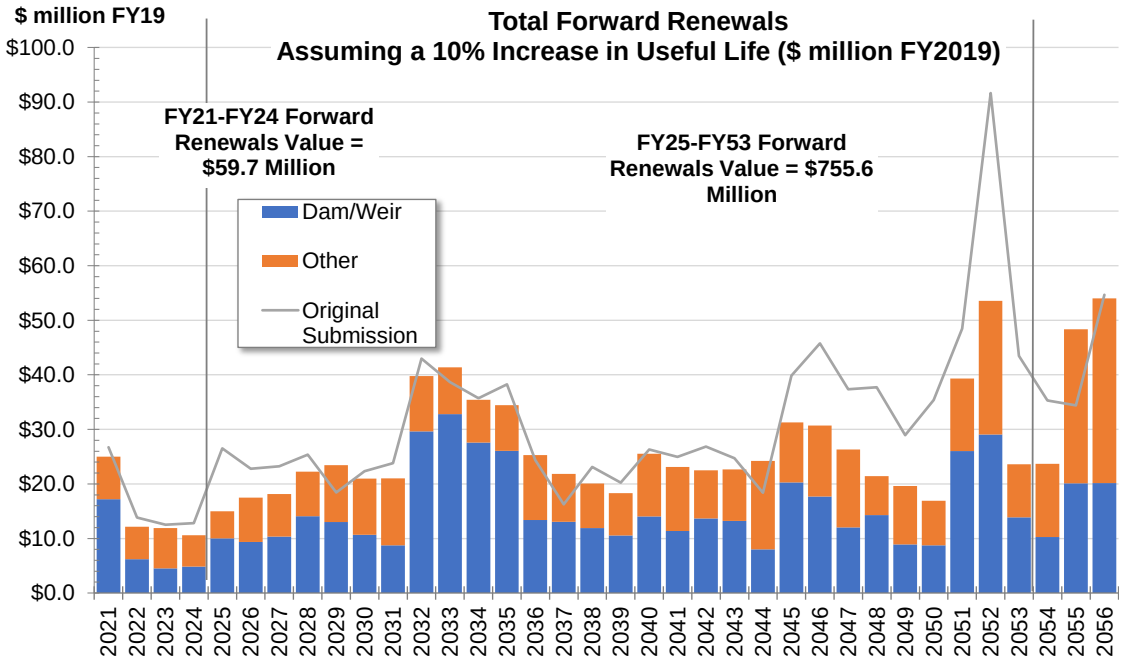

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$26.72	$24.99
2022	$13.84	$12.17
2023	$12.51	$11.92
2024	$12.83	$10.61
2025	$26.51	$14.98
2026	$22.78	$17.49
2027	$23.23	$18.13
2028	$25.39	$22.24
2029	$18.44	$23.45
2030	$22.32	$20.98
2031	$23.80	$21.00
2032	$42.98	$39.79
2033	$38.68	$41.38
2034	$35.73	$35.42
2035	$38.24	$34.43
2036	$24.40	$25.27
2037	$16.27	$21.82
2038	$23.10	$20.05
2039	$20.23	$18.32
2040	$26.29	$25.53
2041	$24.97	$23.13
2042	$26.84	$22.51
2043	$24.73	$22.67
2044	$18.39	$24.22
2045	$39.86	$31.29
2046	$45.78	$30.72
2047	$37.34	$26.31
2048	$37.73	$21.42
2049	$28.95	$19.63
2050	$35.40	$16.93
2051	$48.48	$39.32
2052	$91.63	$53.56
2053	$43.49	$23.60

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2.0 Barker Barambah bulk

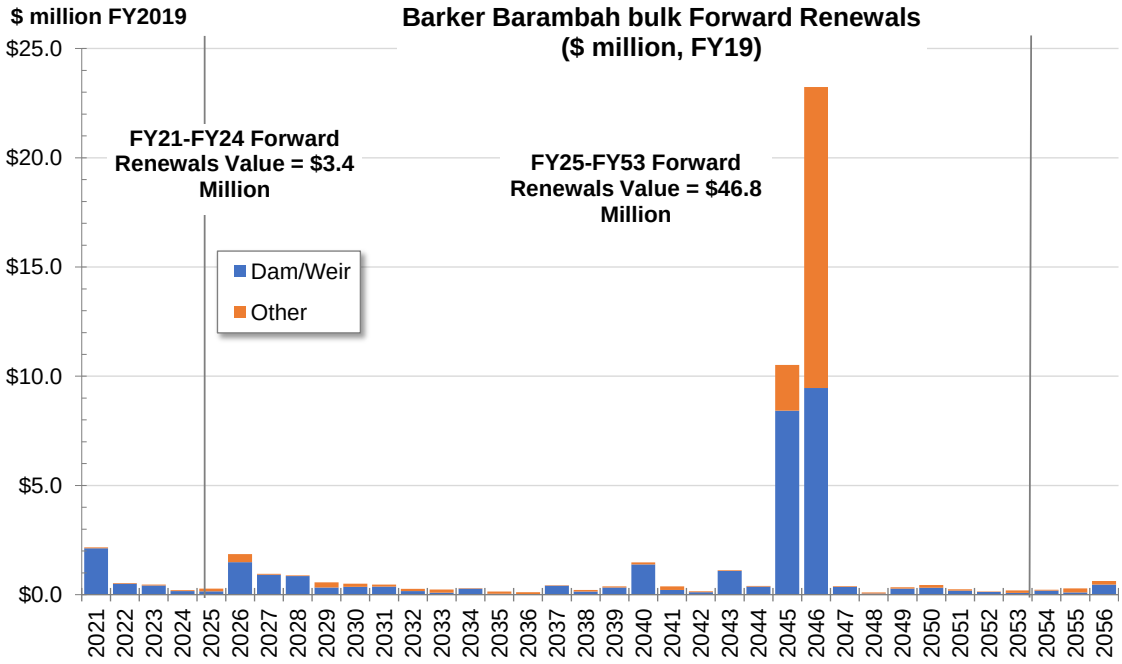

Figure 1

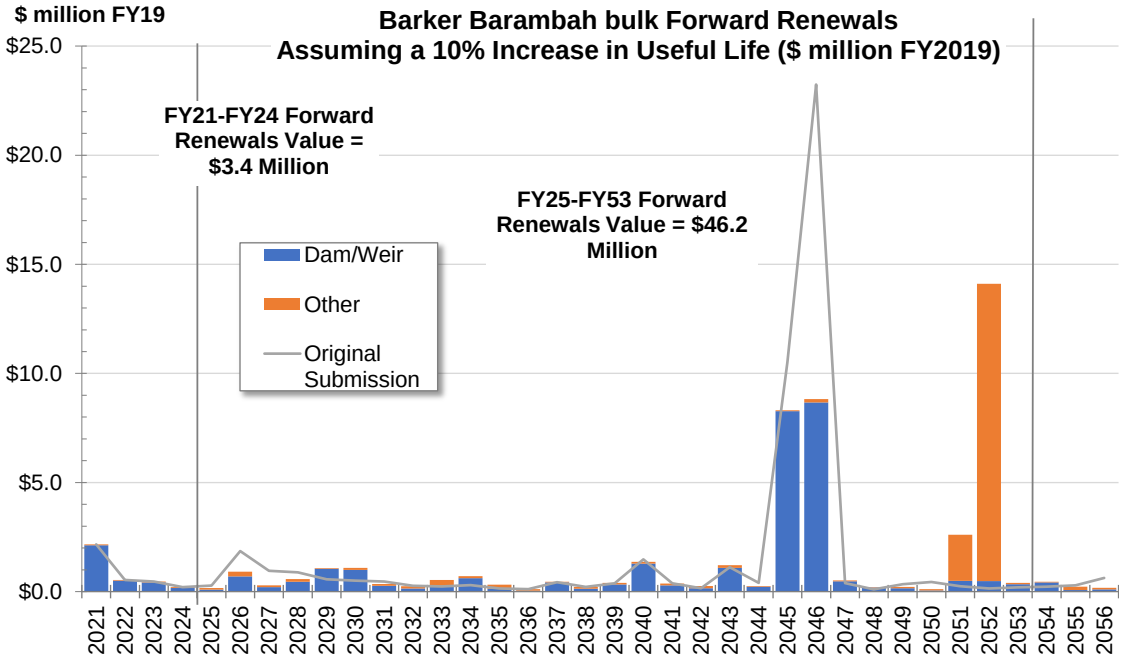

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Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$2.17	$2.17
2022	$0.53	$0.53
2023	$0.46	$0.46
2024	$0.20	$0.20
2025	$0.28	$0.17
2026	$1.86	$0.91
2027	$0.96	$0.28
2028	$0.88	$0.58
2029	$0.56	$1.07
2030	$0.51	$1.08
2031	$0.47	$0.36
2032	$0.27	$0.25
2033	$0.24	$0.54
2034	$0.30	$0.71
2035	$0.14	$0.32
2036	$0.12	$0.11
2037	$0.44	$0.45
2038	$0.22	$0.22
2039	$0.38	$0.40
2040	$1.48	$1.37
2041	$0.39	$0.37
2042	$0.16	$0.26
2043	$1.12	$1.21
2044	$0.40	$0.26
2045	$10.52	$8.31
2046	$23.24	$8.82
2047	$0.39	$0.51
2048	$0.11	$0.21
2049	$0.34	$0.22
2050	$0.45	$0.12
2051	$0.25	$2.61
2052	$0.15	$14.11
2053	$0.20	$0.40

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Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

3.0 Bowen Broken Rivers

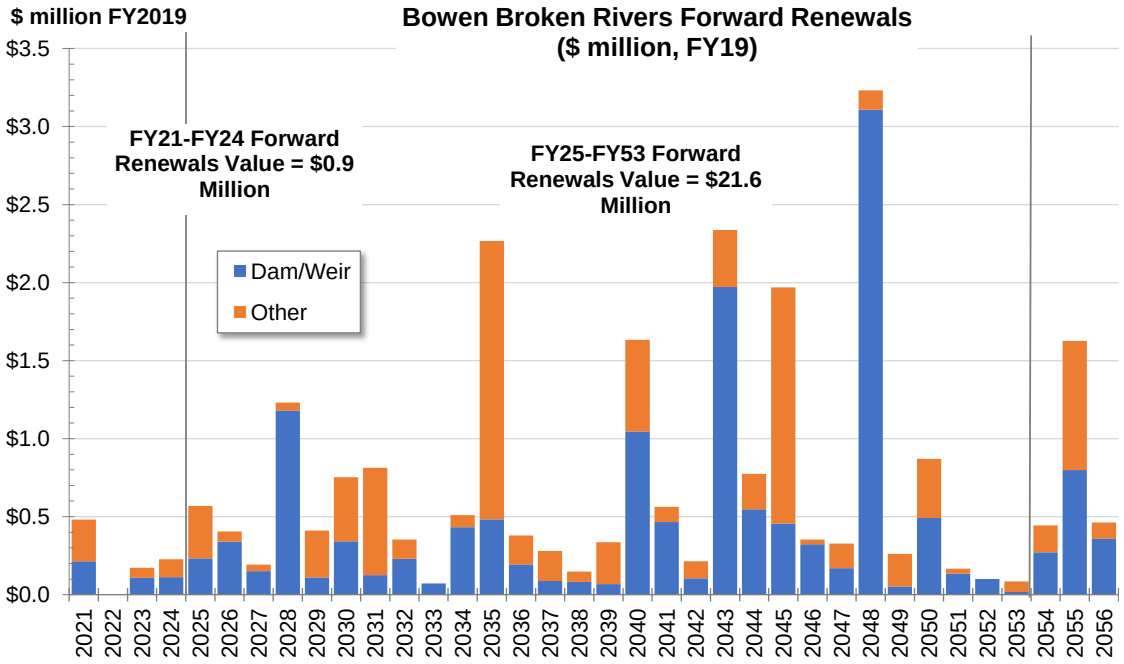
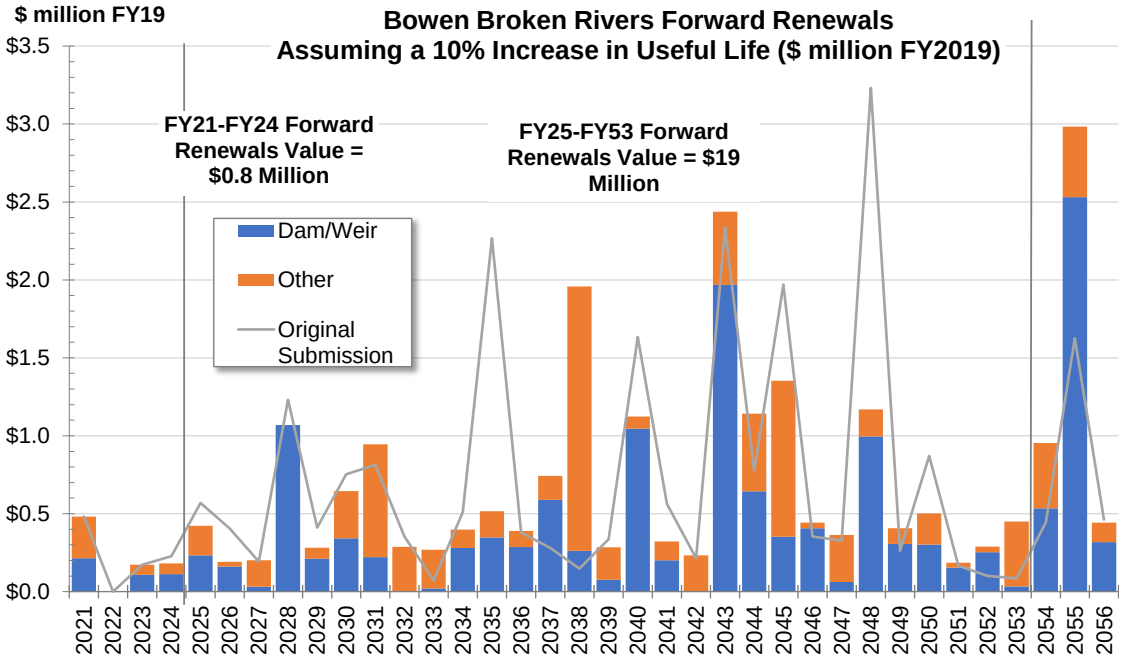


Figure 1



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	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.48	$0.48
2022		
2023	$0.17	$0.17
2024	$0.23	$0.18
2025	$0.57	$0.42
2026	$0.40	$0.19
2027	$0.19	$0.20
2028	$1.23	$1.07
2029	$0.41	$0.28
2030	$0.75	$0.65
2031	$0.81	$0.95
2032	$0.35	$0.29
2033	$0.07	$0.27
2034	$0.51	$0.40
2035	$2.27	$0.52
2036	$0.38	$0.39
2037	$0.28	$0.74
2038	$0.15	$1.96
2039	$0.34	$0.28
2040	$1.63	$1.12
2041	$0.56	$0.32
2042	$0.21	$0.23
2043	$2.34	$2.44
2044	$0.77	$1.14
2045	$1.97	$1.35
2046	$0.35	$0.44
2047	$0.33	$0.36
2048	$3.23	$1.17
2049	$0.26	$0.41
2050	$0.87	$0.50
2051	$0.17	$0.18
2052	$0.10	$0.29
2053	$0.08	$0.45

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4.0 Boyne River & Tarong

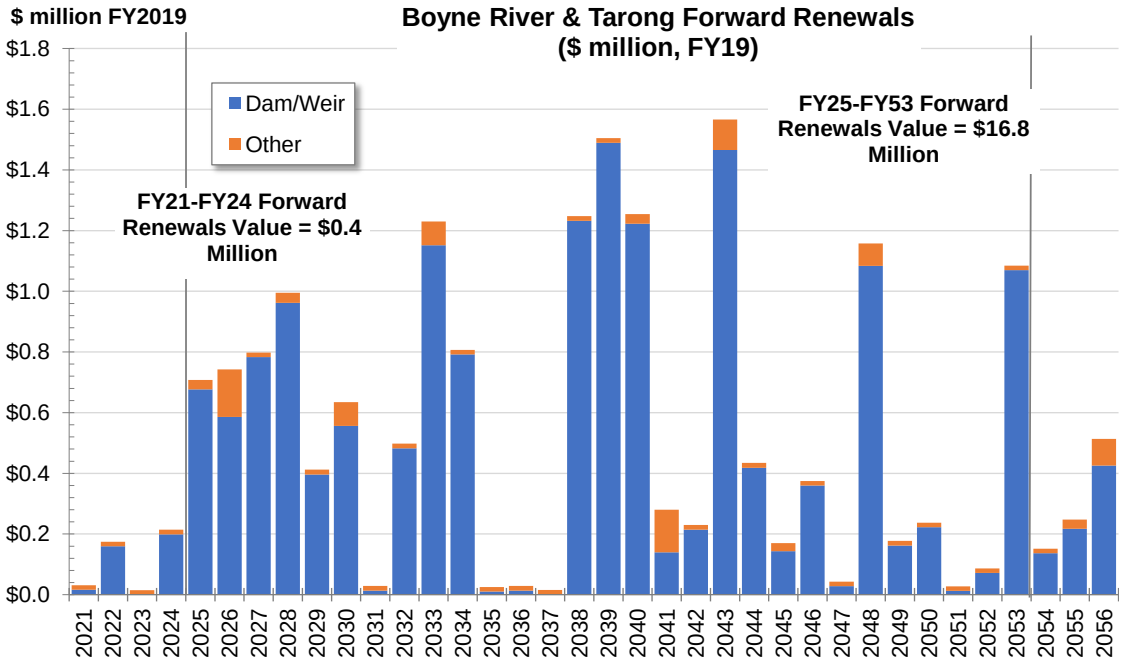

Figure 1

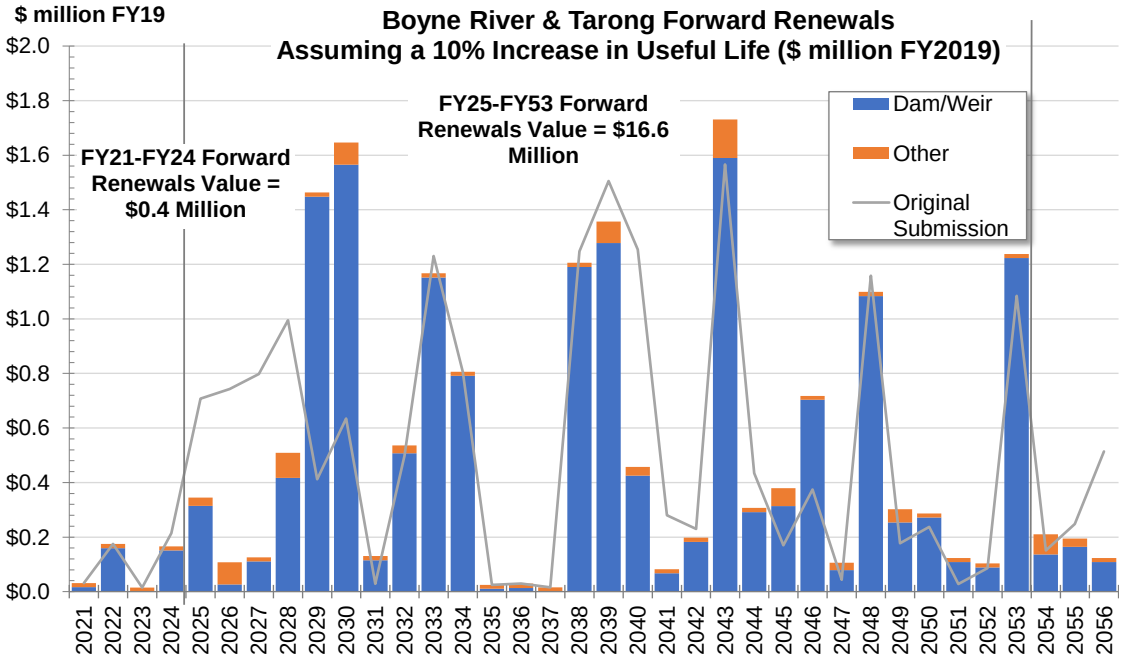

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Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.03	$0.03
2022	$0.17	$0.17
2023	$0.02	$0.02
2024	$0.21	$0.17
2025	$0.71	$0.34
2026	$0.74	$0.11
2027	$0.80	$0.13
2028	$1.00	$0.51
2029	$0.41	$1.46
2030	$0.63	$1.65
2031	$0.03	$0.13
2032	$0.50	$0.54
2033	$1.23	$1.17
2034	$0.81	$0.81
2035	$0.03	$0.03
2036	$0.03	$0.03
2037	$0.02	$0.02
2038	$1.25	$1.21
2039	$1.51	$1.36
2040	$1.25	$0.46
2041	$0.28	$0.08
2042	$0.23	$0.20
2043	$1.57	$1.73
2044	$0.43	$0.31
2045	$0.17	$0.38
2046	$0.37	$0.72
2047	$0.04	$0.11
2048	$1.16	$1.10
2049	$0.18	$0.30
2050	$0.24	$0.29
2051	$0.03	$0.12
2052	$0.09	$0.10
2053	$1.08	$1.24

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

5.0 Bundaberg bulk

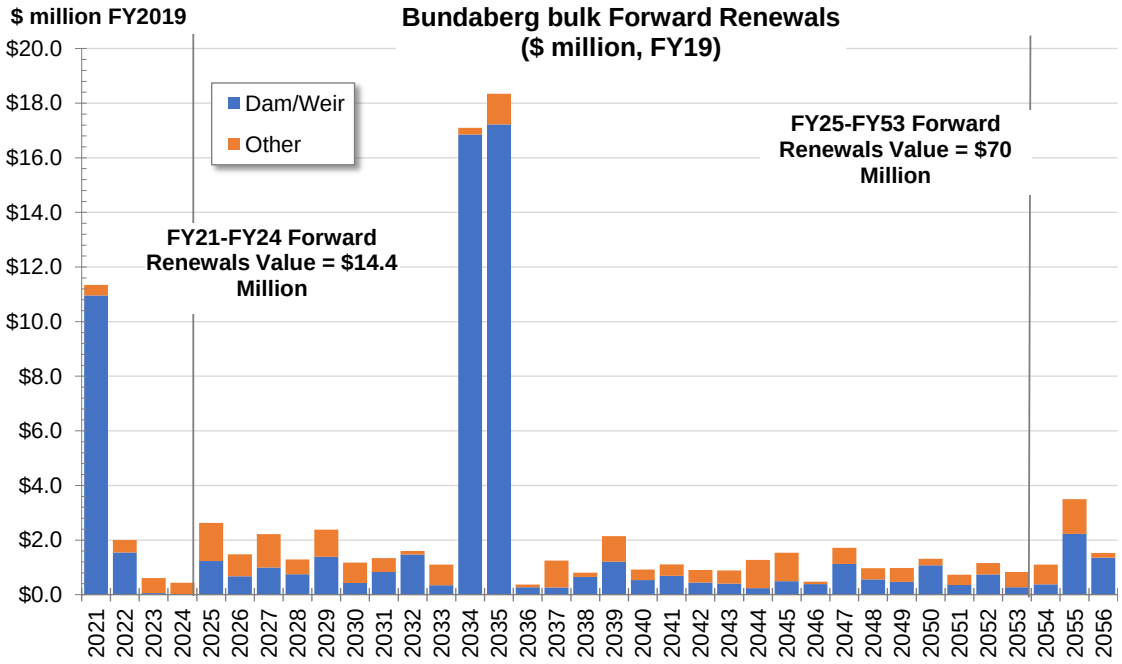

Figure 1

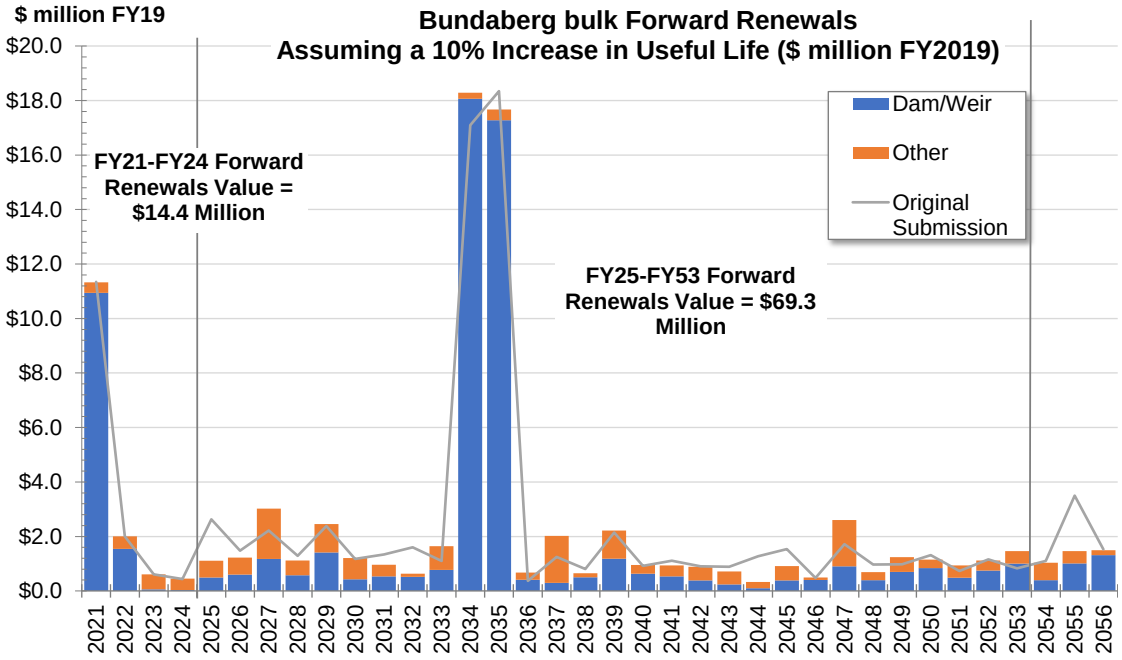

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$11.34	$11.32
2022	$2.01	$2.01
2023	$0.61	$0.61
2024	$0.44	$0.45
2025	$2.63	$1.11
2026	$1.48	$1.22
2027	$2.22	$3.02
2028	$1.29	$1.12
2029	$2.38	$2.46
2030	$1.18	$1.21
2031	$1.34	$0.96
2032	$1.60	$0.63
2033	$1.10	$1.64
2034	$17.10	$18.29
2035	$18.35	$17.67
2036	$0.37	$0.67
2037	$1.25	$2.02
2038	$0.80	$0.65
2039	$2.14	$2.21
2040	$0.92	$0.96
2041	$1.11	$0.94
2042	$0.90	$0.89
2043	$0.89	$0.72
2044	$1.27	$0.33
2045	$1.54	$0.91
2046	$0.48	$0.49
2047	$1.72	$2.61
2048	$0.97	$0.69
2049	$0.98	$1.24
2050	$1.32	$1.15
2051	$0.73	$0.94
2052	$1.16	$1.12
2053	$0.83	$1.47

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

6.0 Burdekin Haughton bulk

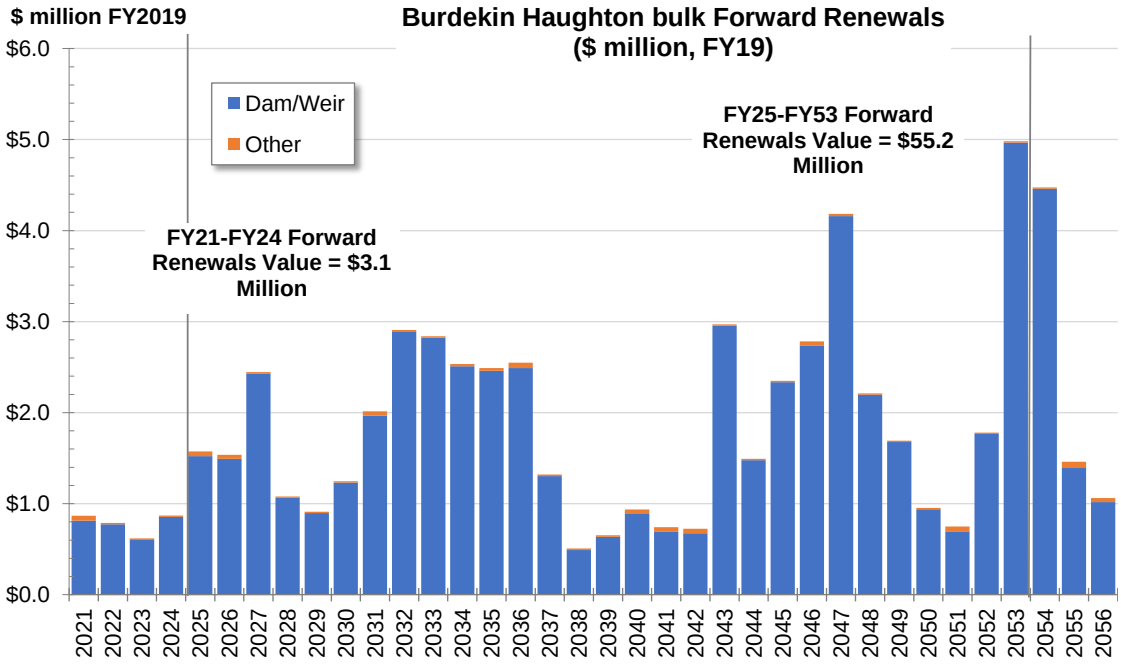

Figure 1

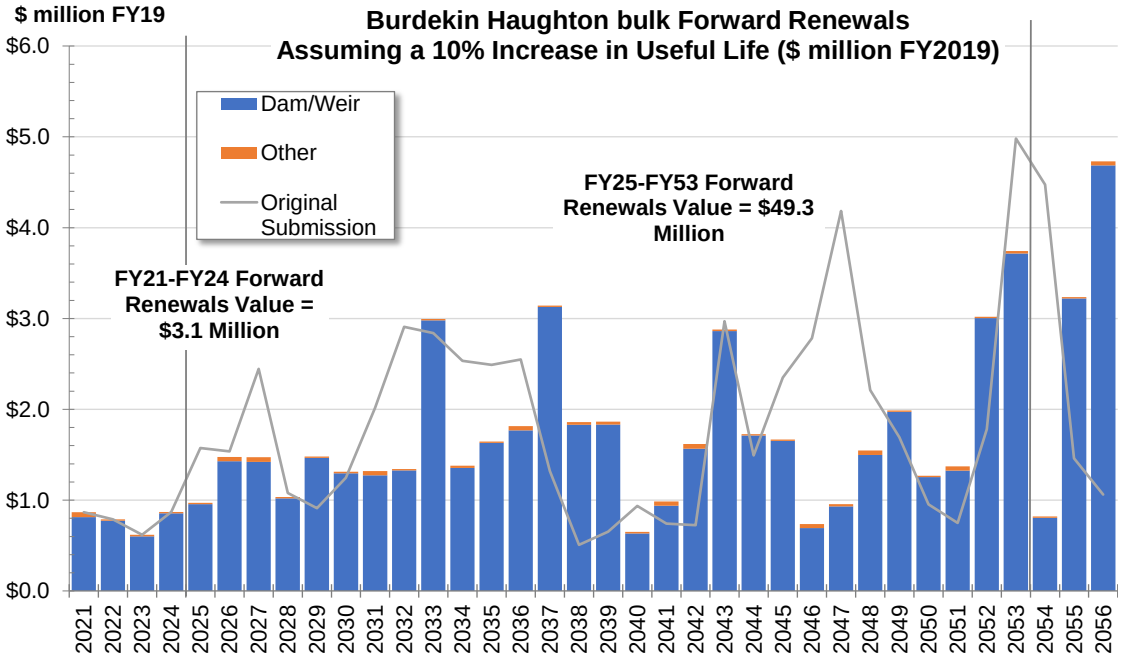

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.87	$0.87
2022	$0.79	$0.79
2023	$0.62	$0.62
2024	$0.87	$0.87
2025	$1.57	$0.97
2026	$1.54	$1.48
2027	$2.45	$1.47
2028	$1.08	$1.04
2029	$0.91	$1.48
2030	$1.25	$1.31
2031	$2.01	$1.32
2032	$2.91	$1.34
2033	$2.84	$3.00
2034	$2.53	$1.38
2035	$2.49	$1.65
2036	$2.55	$1.81
2037	$1.32	$3.14
2038	$0.51	$1.86
2039	$0.65	$1.86
2040	$0.94	$0.65
2041	$0.74	$0.99
2042	$0.73	$1.62
2043	$2.97	$2.88
2044	$1.49	$1.73
2045	$2.35	$1.67
2046	$2.78	$0.74
2047	$4.18	$0.96
2048	$2.21	$1.55
2049	$1.69	$1.99
2050	$0.95	$1.27
2051	$0.75	$1.37
2052	$1.78	$3.02
2053	$4.98	$3.74

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

7.0 Callide Valley

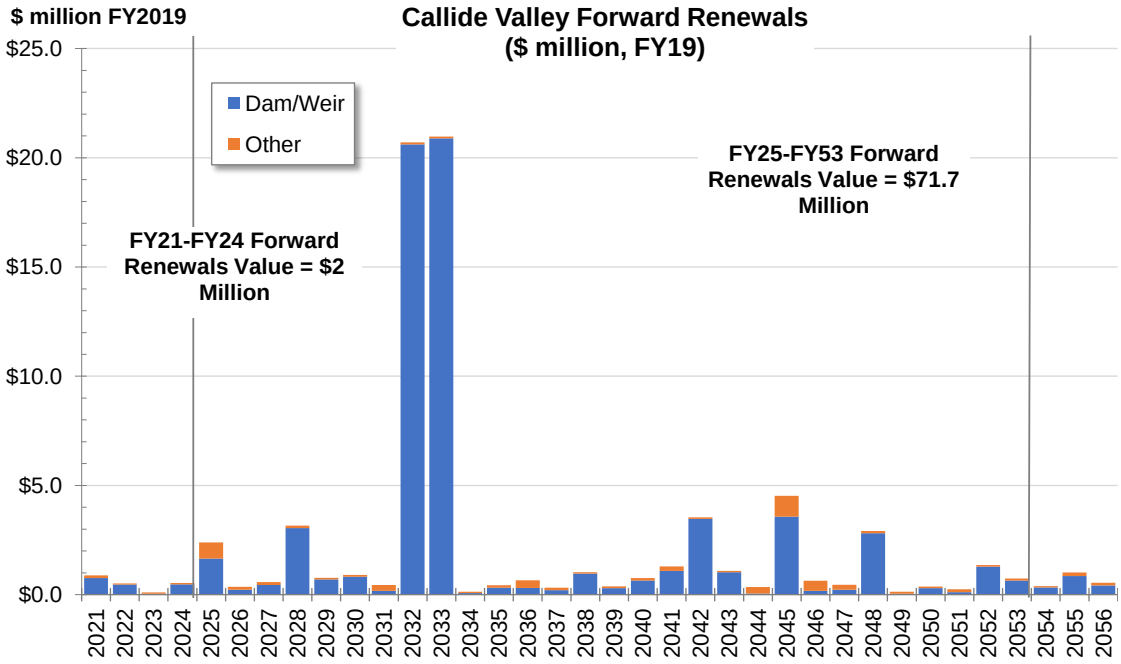

Figure 1

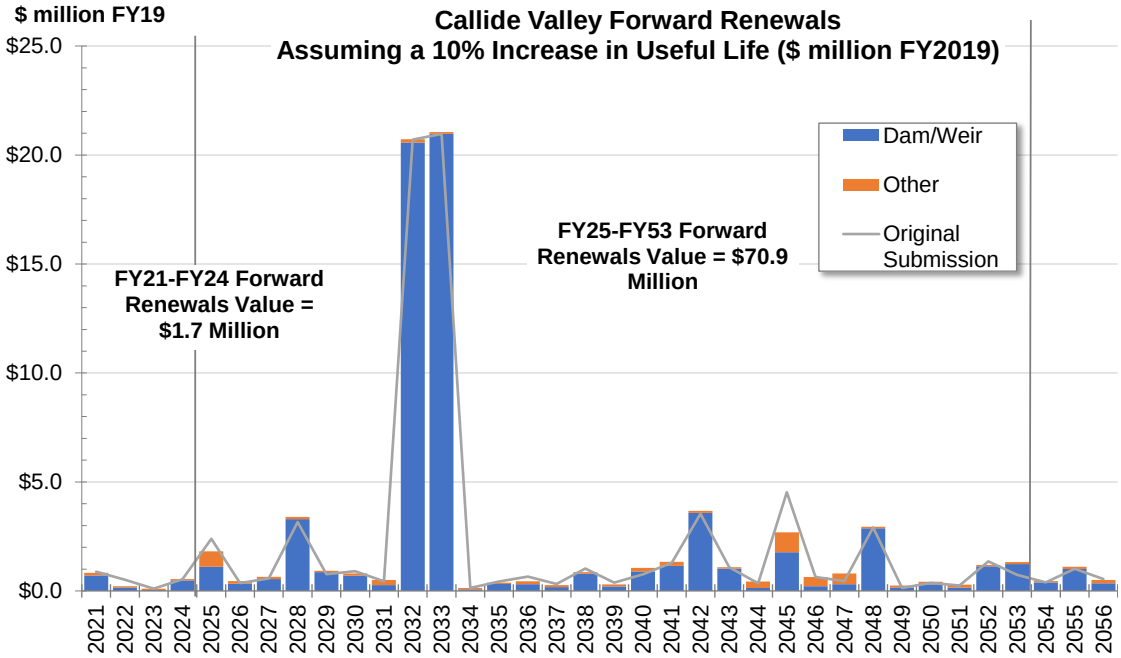

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.89	$0.84
2022	$0.52	$0.22
2023	$0.10	$0.10
2024	$0.54	$0.55
2025	$2.39	$1.82
2026	$0.36	$0.46
2027	$0.58	$0.65
2028	$3.16	$3.39
2029	$0.77	$0.93
2030	$0.91	$0.80
2031	$0.44	$0.50
2032	$20.70	$20.73
2033	$20.97	$21.06
2034	$0.13	$0.14
2035	$0.43	$0.38
2036	$0.66	$0.45
2037	$0.32	$0.27
2038	$1.03	$0.86
2039	$0.39	$0.30
2040	$0.76	$1.05
2041	$1.29	$1.33
2042	$3.54	$3.68
2043	$1.09	$1.09
2044	$0.35	$0.43
2045	$4.53	$2.69
2046	$0.64	$0.64
2047	$0.46	$0.81
2048	$2.92	$2.94
2049	$0.13	$0.25
2050	$0.37	$0.42
2051	$0.25	$0.29
2052	$1.35	$1.19
2053	$0.74	$1.33

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

8.0 Chinchilla Weir

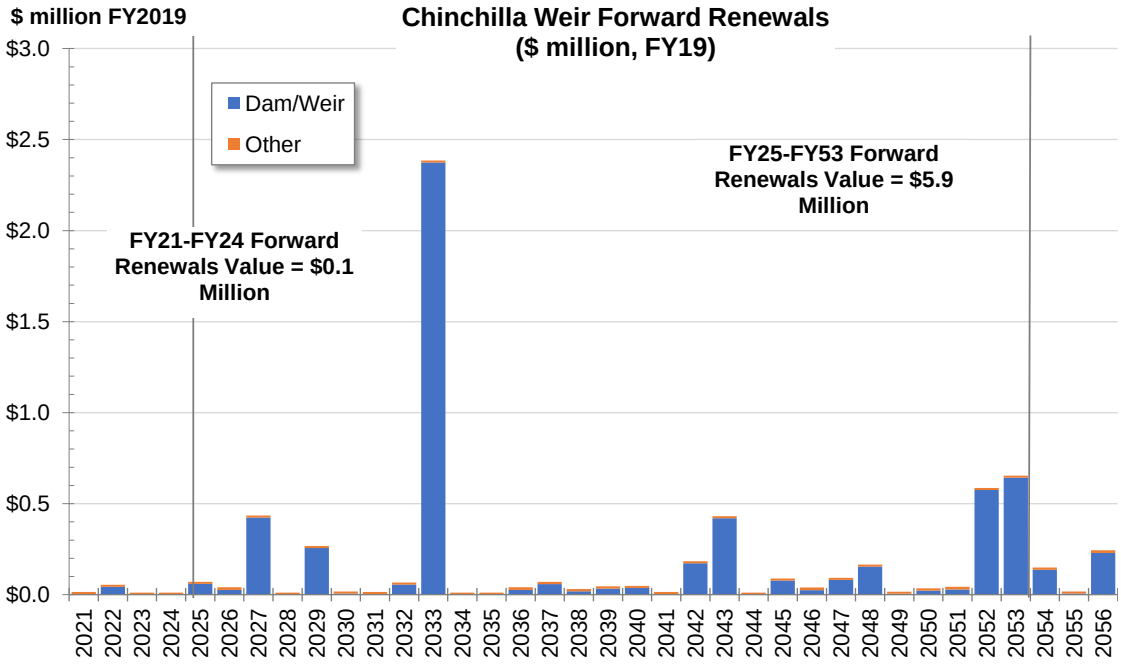

Figure 1

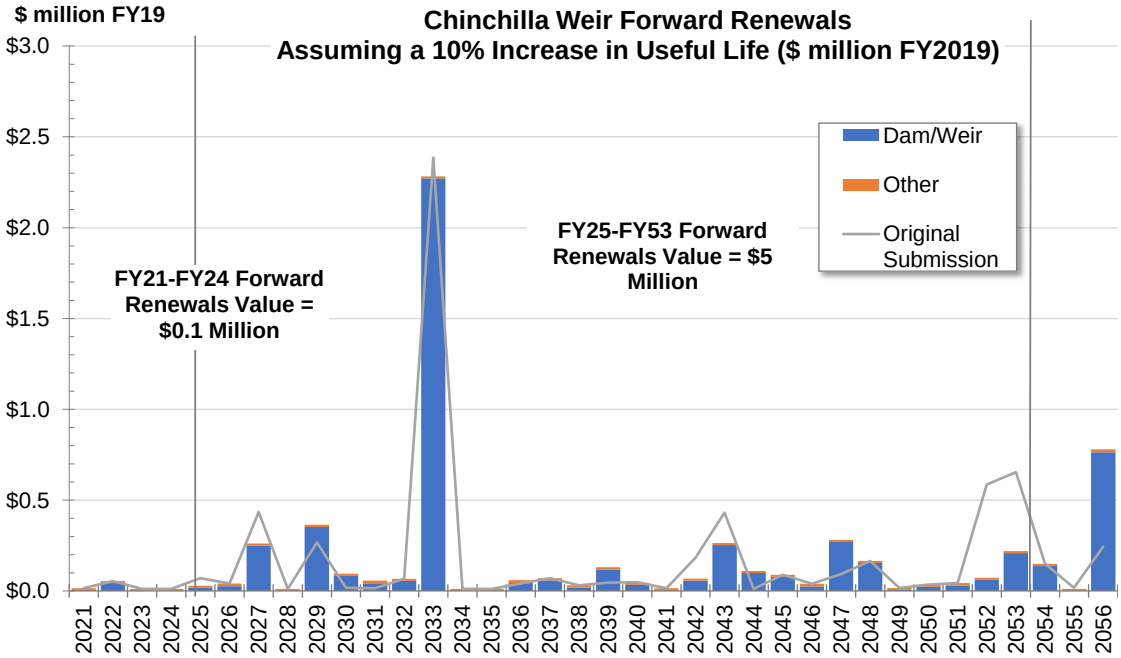

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.01	$0.01
2022	$0.05	$0.05
2023	$0.01	$0.01
2024	$0.01	$0.01
2025	$0.07	$0.03
2026	$0.04	$0.04
2027	$0.43	$0.26
2028	$0.01	$0.01
2029	$0.27	$0.36
2030	$0.02	$0.09
2031	$0.02	$0.06
2032	$0.07	$0.07
2033	$2.38	$2.28
2034	$0.01	$0.01
2035	$0.01	$0.01
2036	$0.04	$0.06
2037	$0.07	$0.07
2038	$0.03	$0.03
2039	$0.05	$0.13
2040	$0.05	$0.04
2041	$0.02	$0.02
2042	$0.18	$0.07
2043	$0.43	$0.26
2044	$0.01	$0.11
2045	$0.09	$0.09
2046	$0.04	$0.04
2047	$0.09	$0.28
2048	$0.17	$0.17
2049	$0.02	$0.02
2050	$0.03	$0.03
2051	$0.04	$0.04
2052	$0.59	$0.07
2053	$0.65	$0.22

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

9.0 Cunnamulla

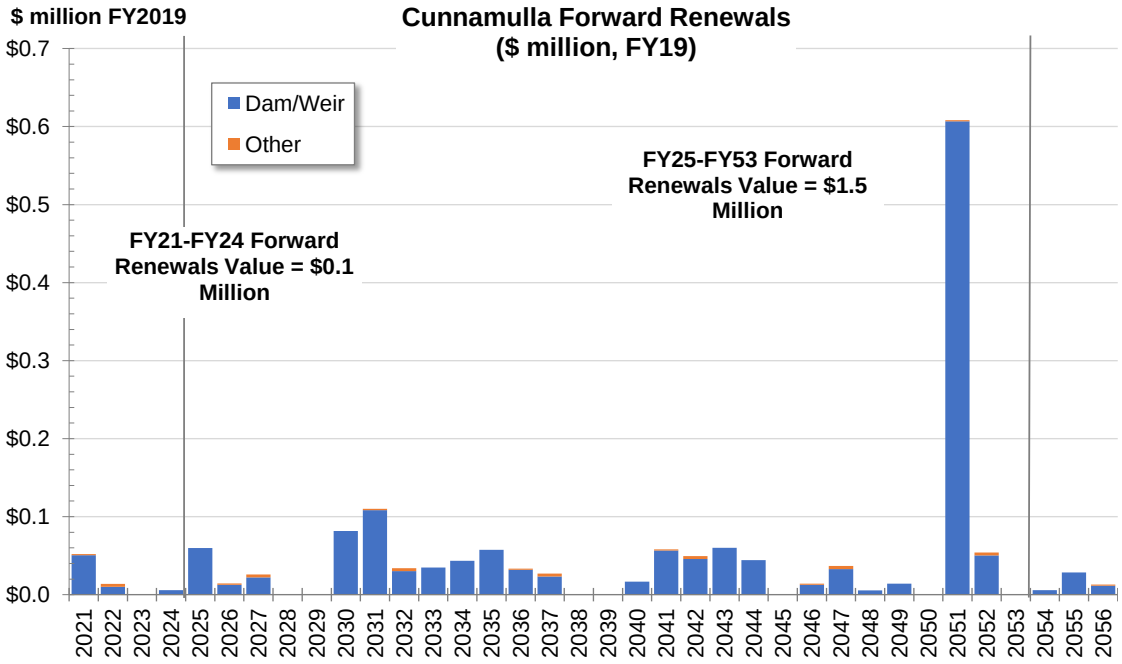

Figure 1

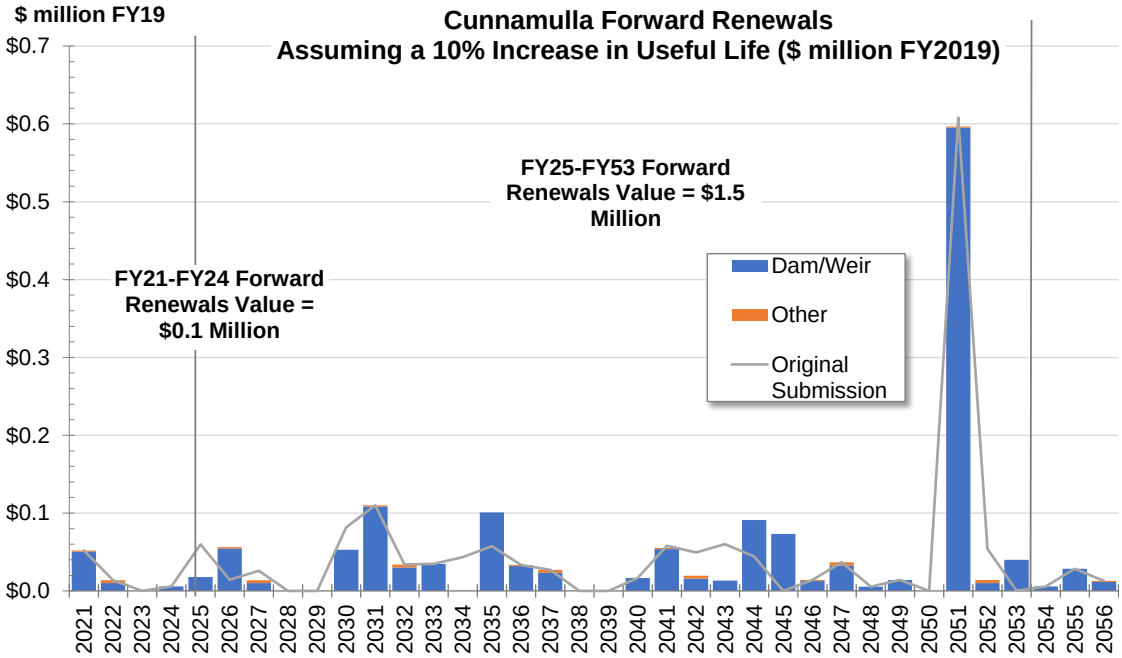

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.05	$0.05
2022	$0.01	$0.01
2023		
2024	$0.01	$0.01
2025	$0.06	$0.02
2026	$0.01	$0.06
2027	$0.03	$0.01
2028		
2029		
2030	$0.08	$0.05
2031	$0.11	$0.11
2032	$0.03	$0.03
2033	$0.03	$0.03
2034	$0.04	
2035	$0.06	$0.10
2036	$0.03	$0.03
2037	$0.03	$0.03
2038		
2039		
2040	$0.02	$0.02
2041	$0.06	$0.06
2042	$0.05	$0.02
2043	$0.06	$0.01
2044	$0.04	$0.09
2045		$0.07
2046	$0.01	$0.01
2047	$0.04	$0.04
2048	$0.01	$0.01
2049	$0.01	$0.01
2050		
2051	$0.61	$0.60
2052	$0.05	$0.01
2053		$0.04

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

10.0 Dawson Valley bulk

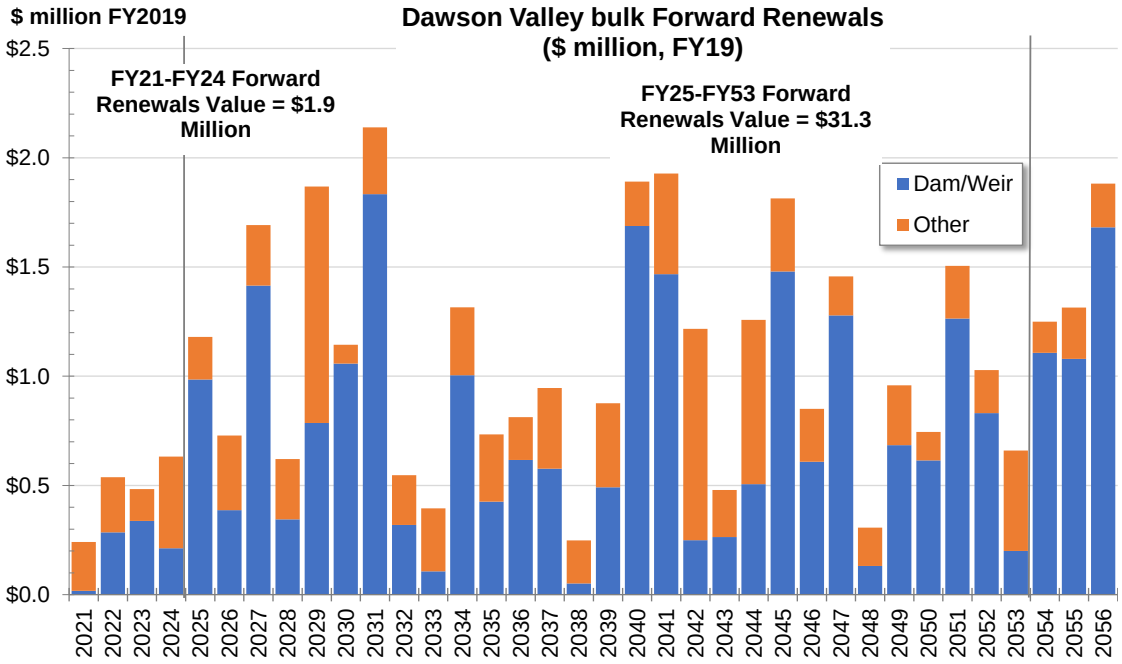

Figure 1

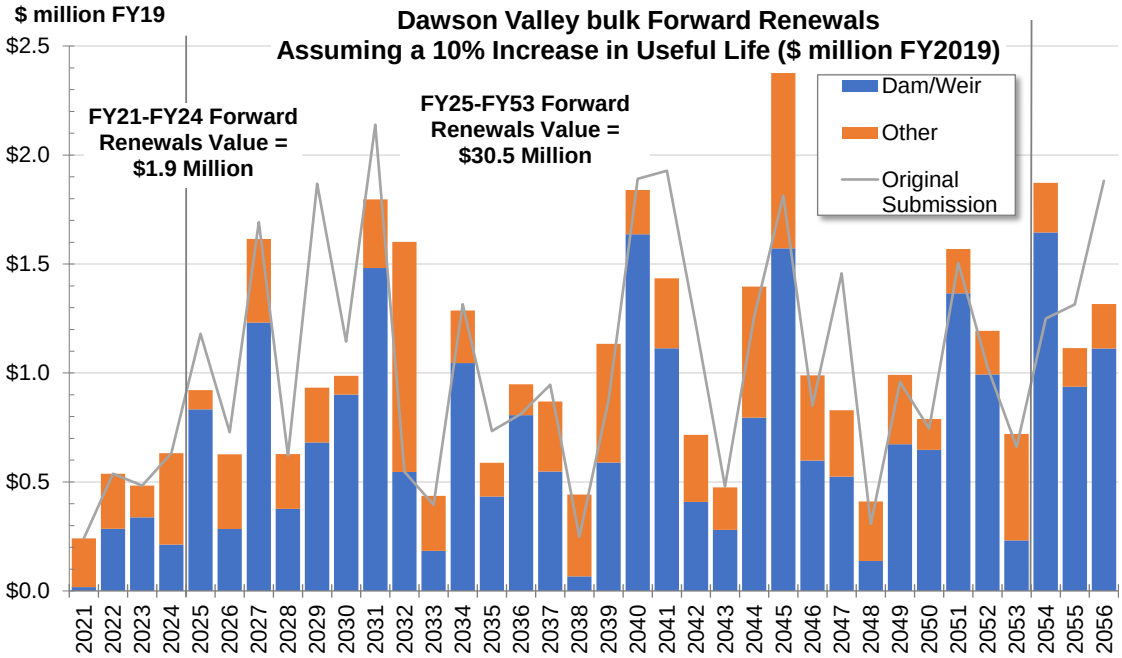

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.24	$0.24
2022	$0.54	$0.54
2023	$0.48	$0.48
2024	$0.63	$0.63
2025	$1.18	$0.92
2026	$0.73	$0.63
2027	$1.69	$1.62
2028	$0.62	$0.63
2029	$1.87	$0.93
2030	$1.14	$0.99
2031	$2.14	$1.80
2032	$0.55	$1.60
2033	$0.40	$0.44
2034	$1.32	$1.29
2035	$0.73	$0.59
2036	$0.81	$0.95
2037	$0.95	$0.87
2038	$0.25	$0.44
2039	$0.88	$1.13
2040	$1.89	$1.84
2041	$1.93	$1.43
2042	$1.22	$0.72
2043	$0.48	$0.48
2044	$1.26	$1.40
2045	$1.81	$2.38
2046	$0.85	$0.99
2047	$1.46	$0.83
2048	$0.31	$0.41
2049	$0.96	$0.99
2050	$0.74	$0.79
2051	$1.51	$1.57
2052	$1.03	$1.19
2053	$0.66	$0.72

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

11.0 Eton bulk

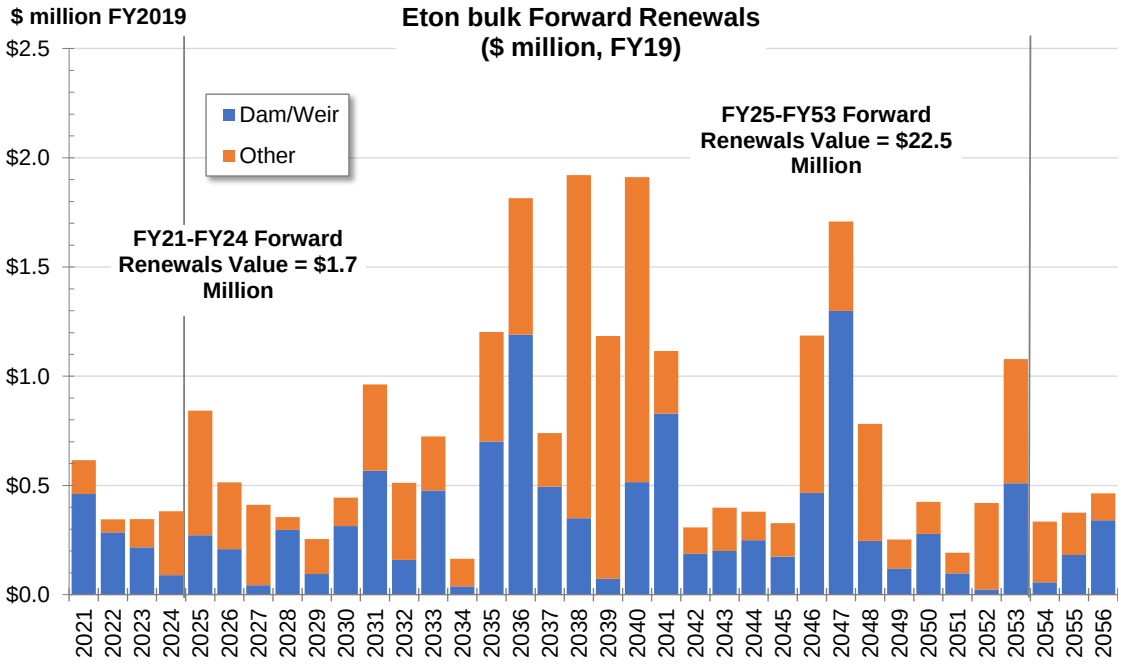

Figure 1

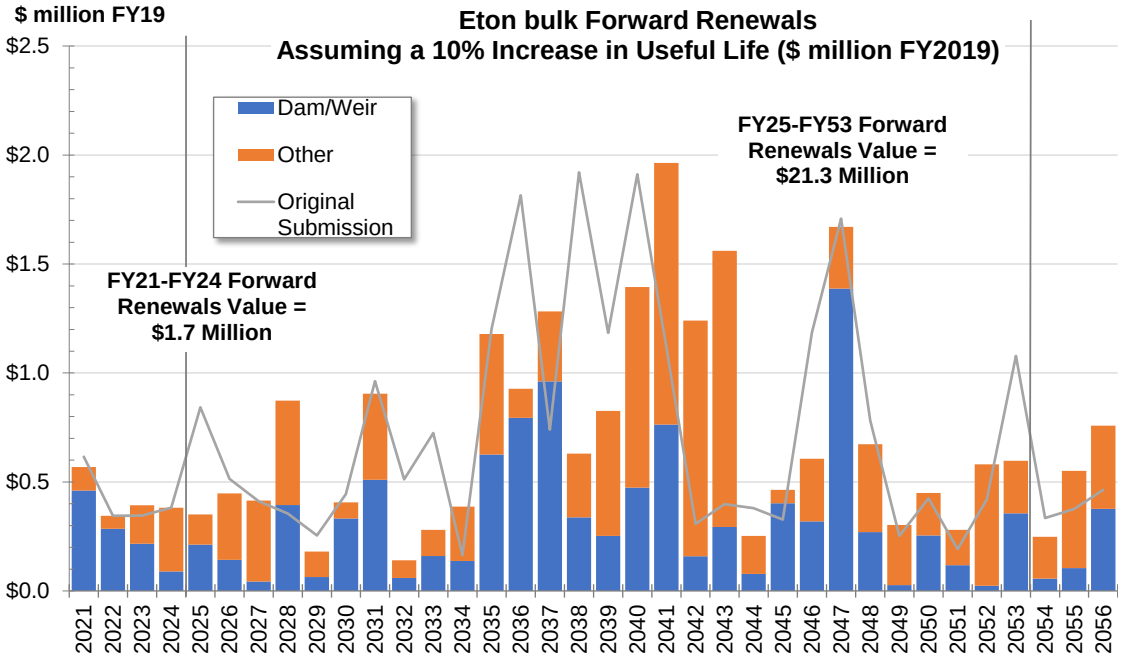

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.62	$0.57
2022	$0.34	$0.34
2023	$0.35	$0.39
2024	$0.38	$0.38
2025	$0.84	$0.35
2026	$0.51	$0.45
2027	$0.41	$0.41
2028	$0.35	$0.87
2029	$0.25	$0.18
2030	$0.44	$0.41
2031	$0.96	$0.90
2032	$0.51	$0.14
2033	$0.72	$0.28
2034	$0.16	$0.39
2035	$1.20	$1.18
2036	$1.82	$0.93
2037	$0.74	$1.28
2038	$1.92	$0.63
2039	$1.18	$0.83
2040	$1.91	$1.39
2041	$1.12	$1.96
2042	$0.31	$1.24
2043	$0.40	$1.56
2044	$0.38	$0.25
2045	$0.33	$0.46
2046	$1.19	$0.61
2047	$1.71	$1.67
2048	$0.78	$0.67
2049	$0.25	$0.30
2050	$0.43	$0.45
2051	$0.19	$0.28
2052	$0.42	$0.58
2053	$1.08	$0.60

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

12.0 Lower Fitzroy

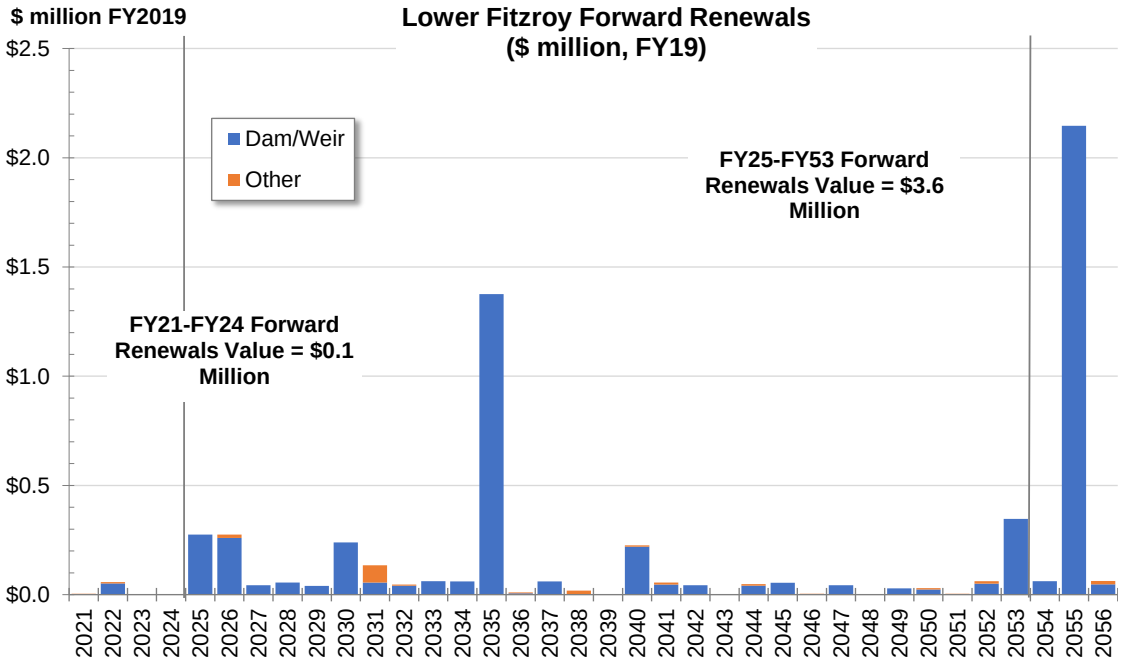

Figure 1

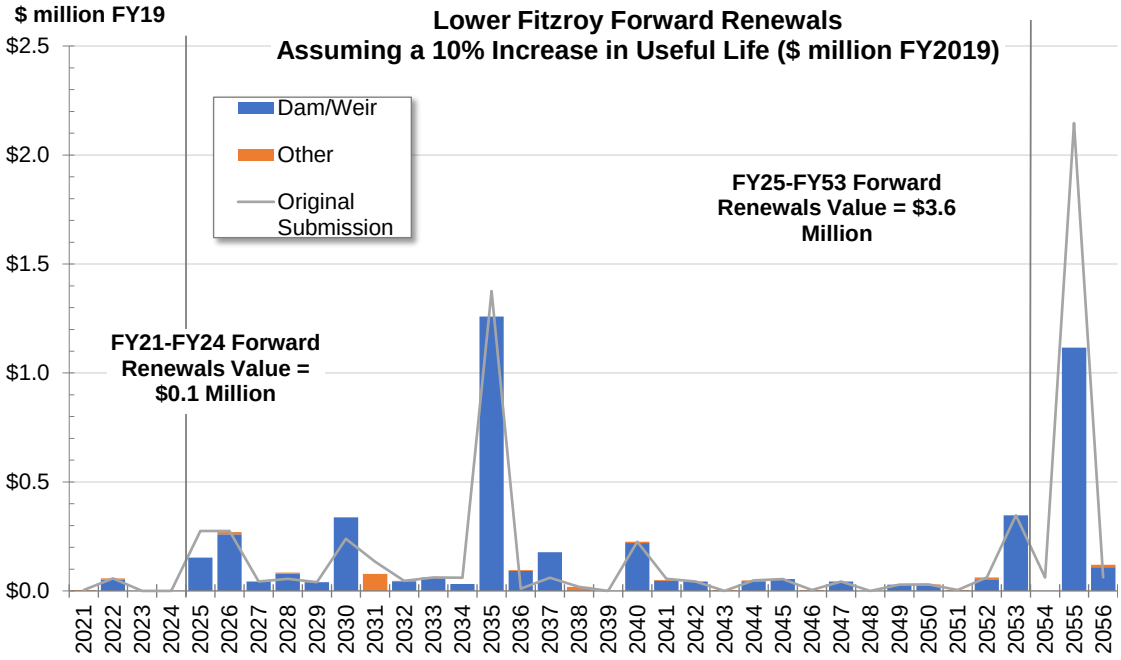

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.00	$0.00
2022	$0.06	$0.06
2023		
2024		
2025	$0.28	$0.15
2026	$0.28	$0.27
2027	$0.04	$0.04
2028	$0.06	$0.08
2029	$0.04	$0.04
2030	$0.24	$0.34
2031	$0.13	$0.08
2032	$0.05	$0.05
2033	$0.06	$0.06
2034	$0.06	$0.03
2035	$1.38	$1.26
2036	$0.01	$0.10
2037	$0.06	$0.18
2038	$0.02	$0.02
2039		
2040	$0.23	$0.23
2041	$0.06	$0.05
2042	$0.04	$0.04
2043		$0.00
2044	$0.05	$0.05
2045	$0.05	$0.05
2046	$0.00	$0.00
2047	$0.04	$0.04
2048		
2049	$0.03	$0.03
2050	$0.03	$0.03
2051	$0.00	$0.00
2052	$0.06	$0.06
2053	$0.35	$0.35

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

13.0 Lower Mary River bulk

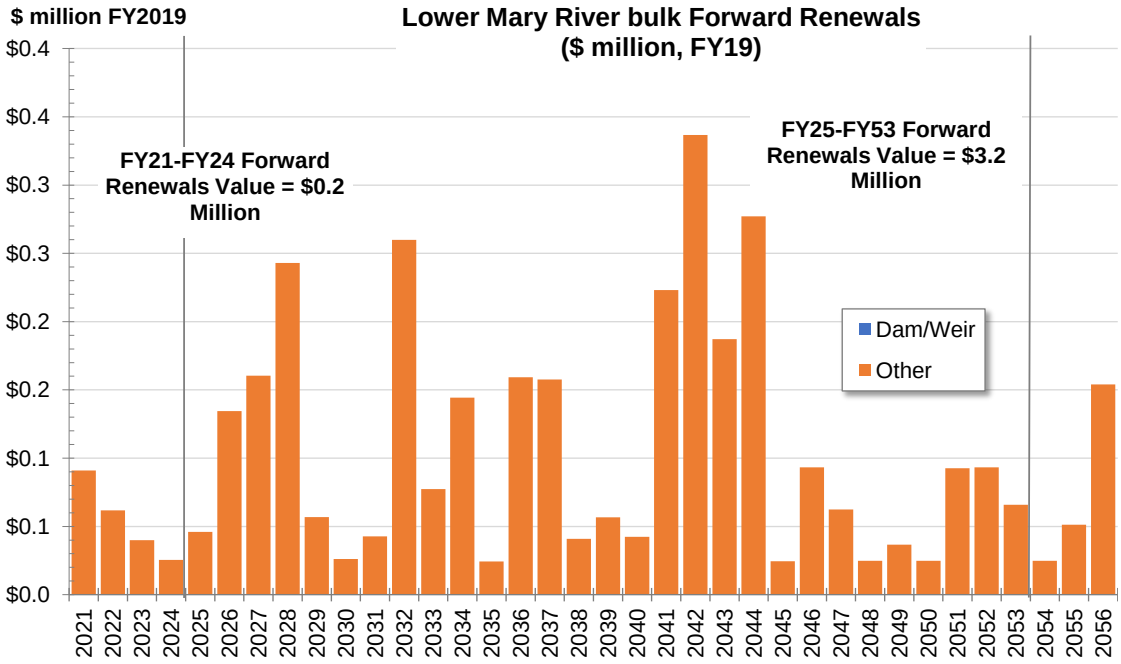

Figure 1

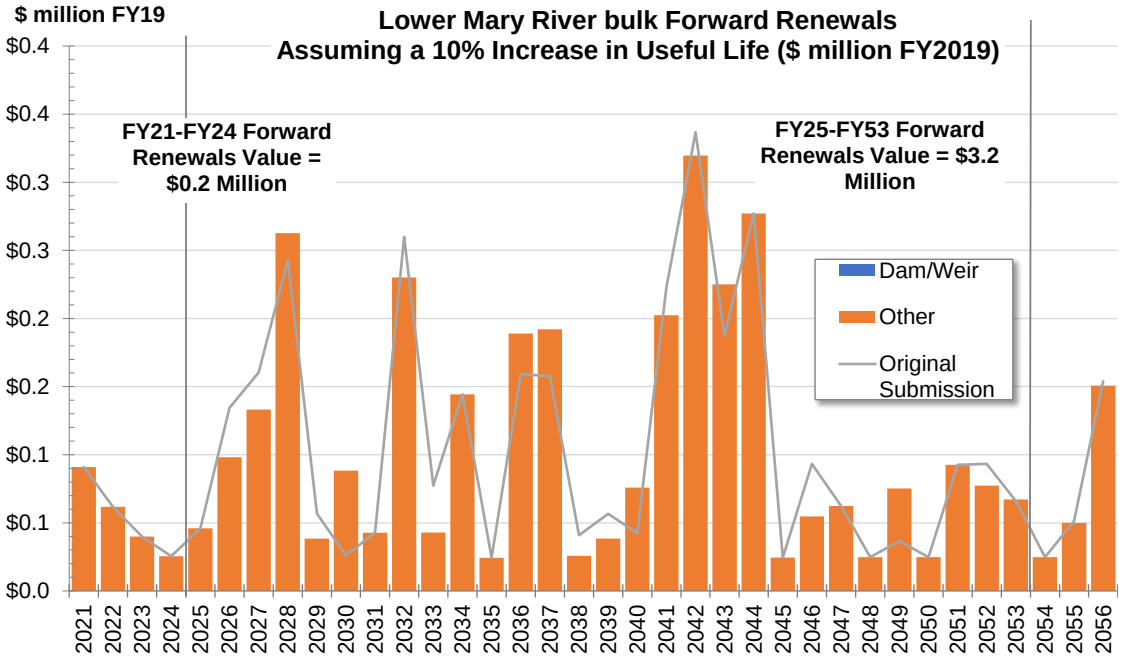

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.09	$0.09
2022	$0.06	$0.06
2023	$0.04	$0.04
2024	$0.03	$0.03
2025	$0.05	$0.05
2026	$0.13	$0.10
2027	$0.16	$0.13
2028	$0.24	$0.26
2029	$0.06	$0.04
2030	$0.03	$0.09
2031	$0.04	$0.04
2032	$0.26	$0.23
2033	$0.08	$0.04
2034	$0.14	$0.14
2035	$0.02	$0.02
2036	$0.16	$0.19
2037	$0.16	$0.19
2038	$0.04	$0.03
2039	$0.06	$0.04
2040	$0.04	$0.08
2041	$0.22	$0.20
2042	$0.34	$0.32
2043	$0.19	$0.22
2044	$0.28	$0.28
2045	$0.02	$0.02
2046	$0.09	$0.05
2047	$0.06	$0.06
2048	$0.02	$0.02
2049	$0.04	$0.08
2050	$0.02	$0.02
2051	$0.09	$0.09
2052	$0.09	$0.08
2053	$0.07	$0.07

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

14.0 Macintyre Brook

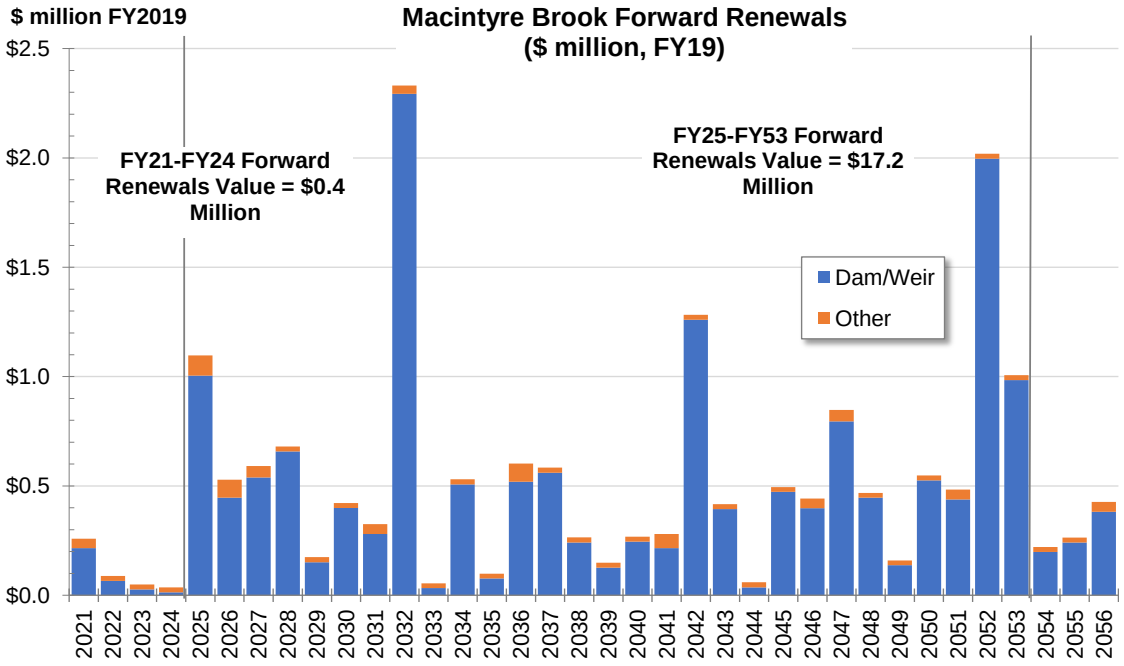

Figure 1

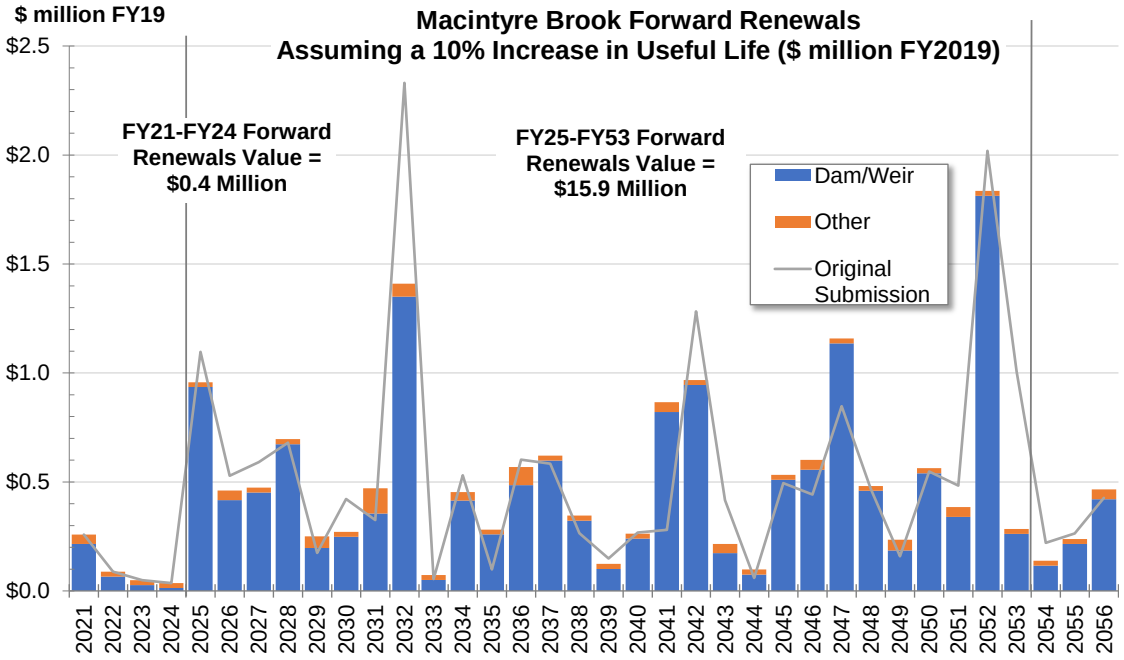

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.26	$0.26
2022	$0.09	$0.09
2023	$0.05	$0.05
2024	$0.04	$0.04
2025	$1.10	$0.96
2026	$0.53	$0.46
2027	$0.59	$0.47
2028	$0.68	$0.70
2029	$0.17	$0.25
2030	$0.42	$0.27
2031	$0.33	$0.47
2032	$2.33	$1.41
2033	$0.05	$0.07
2034	$0.53	$0.45
2035	$0.10	$0.28
2036	$0.60	$0.57
2037	$0.58	$0.62
2038	$0.26	$0.35
2039	$0.15	$0.12
2040	$0.27	$0.26
2041	$0.28	$0.87
2042	$1.28	$0.97
2043	$0.42	$0.22
2044	$0.06	$0.10
2045	$0.49	$0.53
2046	$0.44	$0.60
2047	$0.85	$1.16
2048	$0.47	$0.48
2049	$0.16	$0.24
2050	$0.55	$0.56
2051	$0.48	$0.38
2052	$2.02	$1.84
2053	$1.01	$0.28

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

15.0 Maranoa River

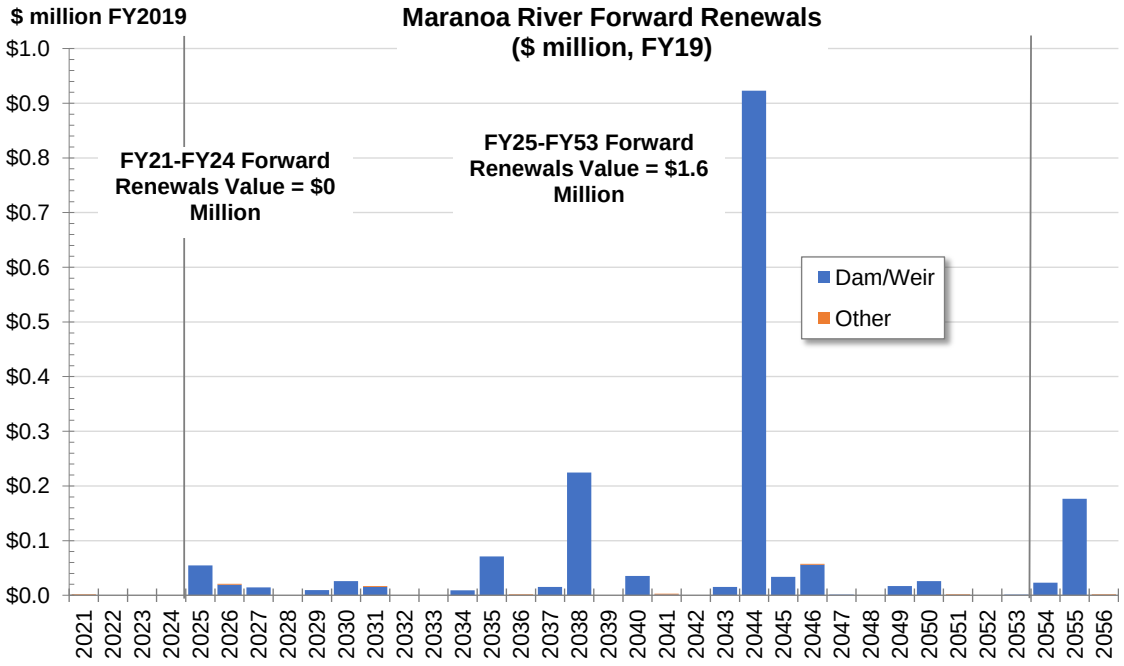

Figure 1

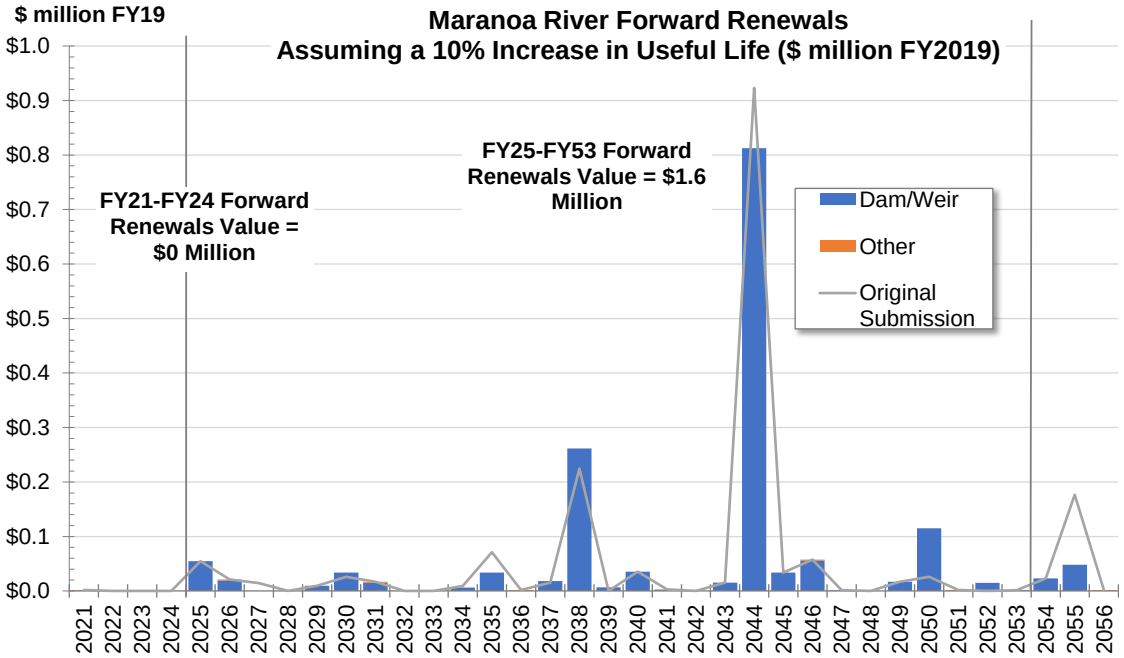

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.00	$0.00
2022		
2023		
2024		
2025	$0.05	$0.05
2026	$0.02	$0.02
2027	$0.01	
2028		
2029	$0.01	$0.01
2030	$0.03	$0.03
2031	$0.02	$0.02
2032		
2033		
2034	$0.01	$0.01
2035	$0.07	$0.03
2036	$0.00	$0.00
2037	$0.02	$0.02
2038	$0.22	$0.26
2039		$0.01
2040	$0.04	$0.04
2041	$0.00	$0.00
2042		
2043	$0.02	$0.02
2044	$0.92	$0.81
2045	$0.03	$0.03
2046	$0.06	$0.06
2047	$0.00	$0.00
2048		
2049	$0.02	$0.02
2050	$0.03	$0.12
2051	$0.00	$0.00
2052		$0.01
2053	$0.00	$0.00

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

16.0 Mareeba-Dimbulah bulk

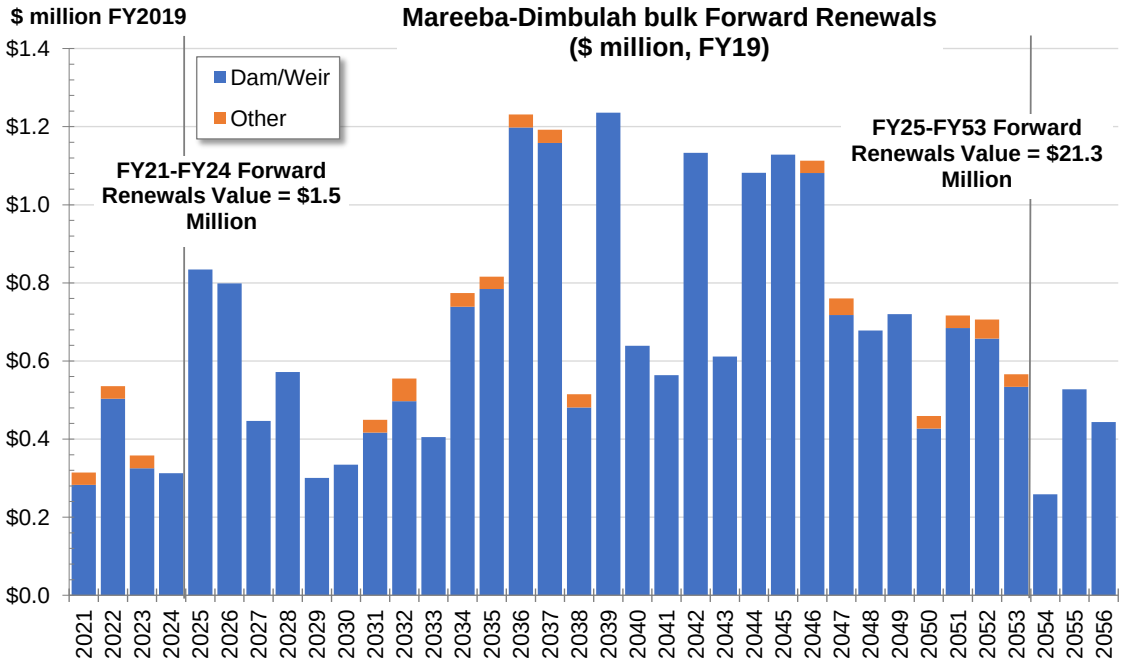

Figure 1

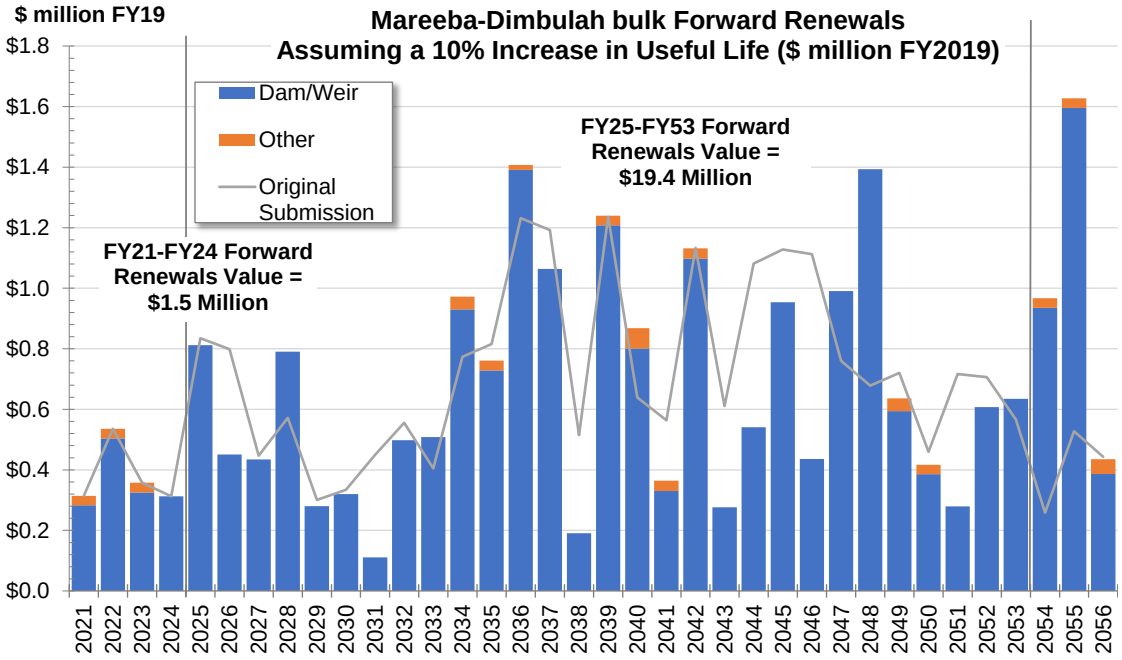

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.31	$0.31
2022	$0.54	$0.54
2023	$0.36	$0.36
2024	$0.31	$0.31
2025	$0.83	$0.81
2026	$0.80	$0.45
2027	$0.45	$0.43
2028	$0.57	$0.79
2029	$0.30	$0.28
2030	$0.33	$0.32
2031	$0.45	$0.11
2032	$0.56	$0.50
2033	$0.41	$0.51
2034	$0.77	$0.97
2035	$0.82	$0.76
2036	$1.23	$1.41
2037	$1.19	$1.06
2038	$0.52	$0.19
2039	$1.24	$1.24
2040	$0.64	$0.87
2041	$0.56	$0.36
2042	$1.13	$1.13
2043	$0.61	$0.28
2044	$1.08	$0.54
2045	$1.13	$0.95
2046	$1.11	$0.44
2047	$0.76	$0.99
2048	$0.68	$1.39
2049	$0.72	$0.64
2050	$0.46	$0.42
2051	$0.72	$0.28
2052	$0.71	$0.61
2053	$0.57	$0.63

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

17.0 Nogoa Mackenzie (bulk)

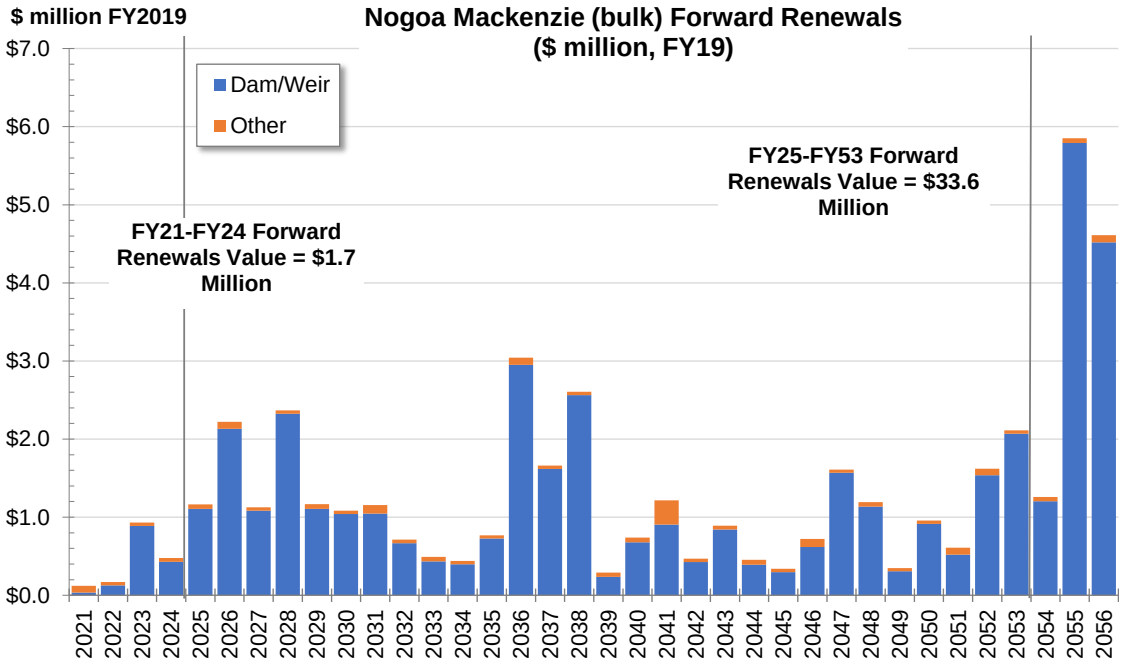

Figure 1

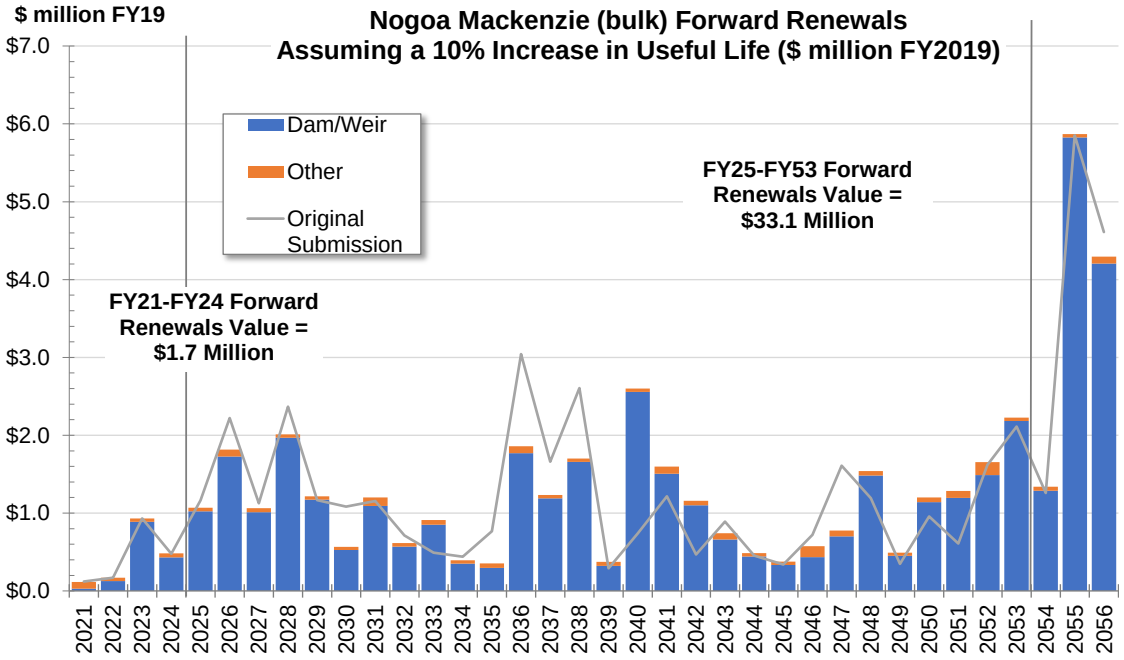

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.12	$0.11
2022	$0.17	$0.17
2023	$0.93	$0.93
2024	$0.48	$0.48
2025	$1.16	$1.07
2026	$2.22	$1.82
2027	$1.13	$1.06
2028	$2.37	$2.01
2029	$1.17	$1.22
2030	$1.08	$0.57
2031	$1.15	$1.20
2032	$0.71	$0.62
2033	$0.49	$0.91
2034	$0.44	$0.39
2035	$0.77	$0.36
2036	$3.04	$1.86
2037	$1.66	$1.23
2038	$2.61	$1.70
2039	$0.29	$0.37
2040	$0.74	$2.60
2041	$1.22	$1.60
2042	$0.47	$1.16
2043	$0.89	$0.74
2044	$0.46	$0.49
2045	$0.34	$0.38
2046	$0.72	$0.58
2047	$1.61	$0.78
2048	$1.19	$1.54
2049	$0.35	$0.49
2050	$0.96	$1.20
2051	$0.61	$1.28
2052	$1.62	$1.66
2053	$2.11	$2.23

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

18.0 Pioneer River

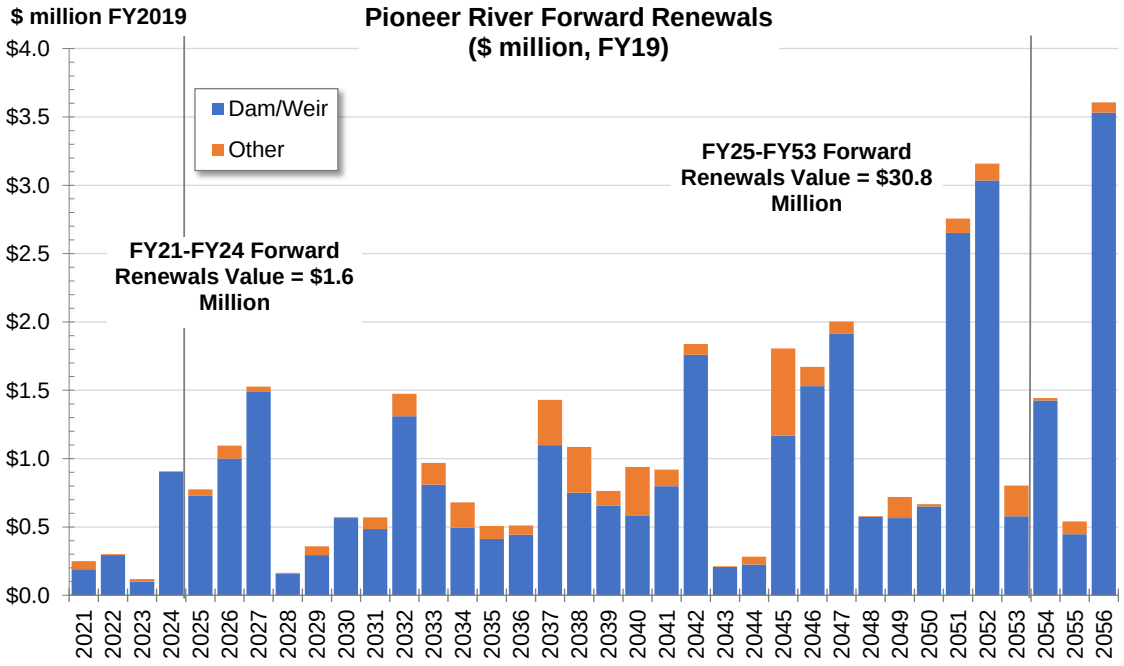

Figure 1

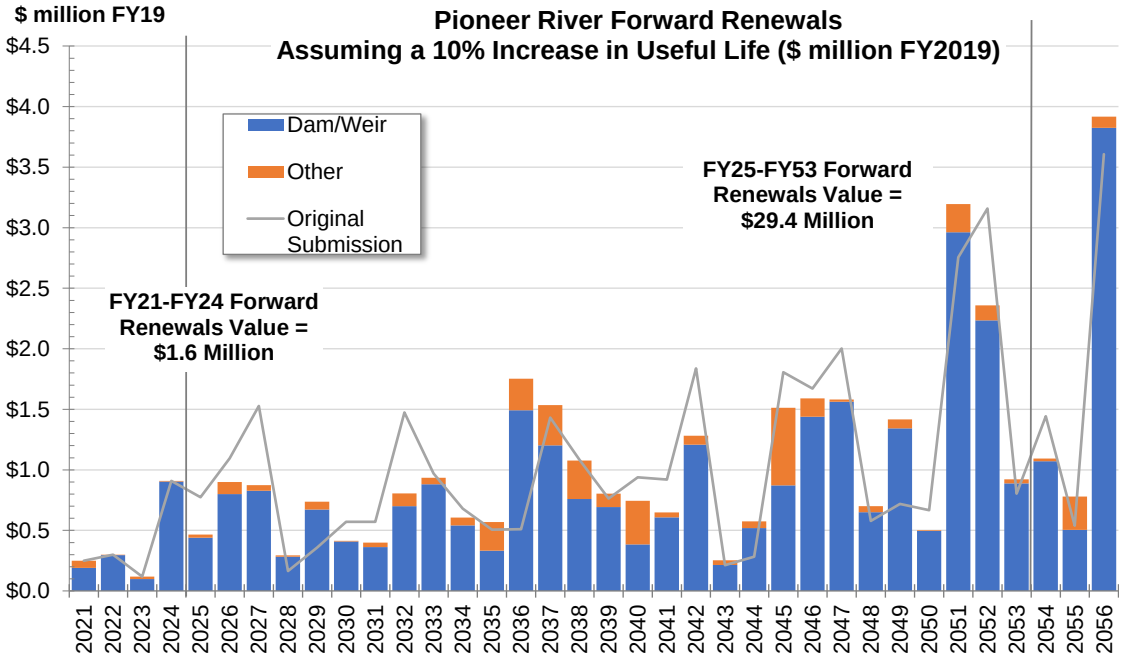

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.25	$0.25
2022	$0.30	$0.30
2023	$0.12	$0.12
2024	$0.91	$0.91
2025	$0.77	$0.47
2026	$1.09	$0.90
2027	$1.53	$0.87
2028	$0.16	$0.29
2029	$0.36	$0.74
2030	$0.57	$0.41
2031	$0.57	$0.40
2032	$1.47	$0.80
2033	$0.97	$0.93
2034	$0.68	$0.61
2035	$0.51	$0.57
2036	$0.51	$1.75
2037	$1.43	$1.53
2038	$1.08	$1.08
2039	$0.76	$0.80
2040	$0.94	$0.75
2041	$0.92	$0.65
2042	$1.84	$1.28
2043	$0.21	$0.25
2044	$0.28	$0.58
2045	$1.81	$1.51
2046	$1.67	$1.59
2047	$2.00	$1.58
2048	$0.58	$0.70
2049	$0.72	$1.42
2050	$0.67	$0.50
2051	$2.76	$3.19
2052	$3.16	$2.36
2053	$0.80	$0.92

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

19.0 Proserpine

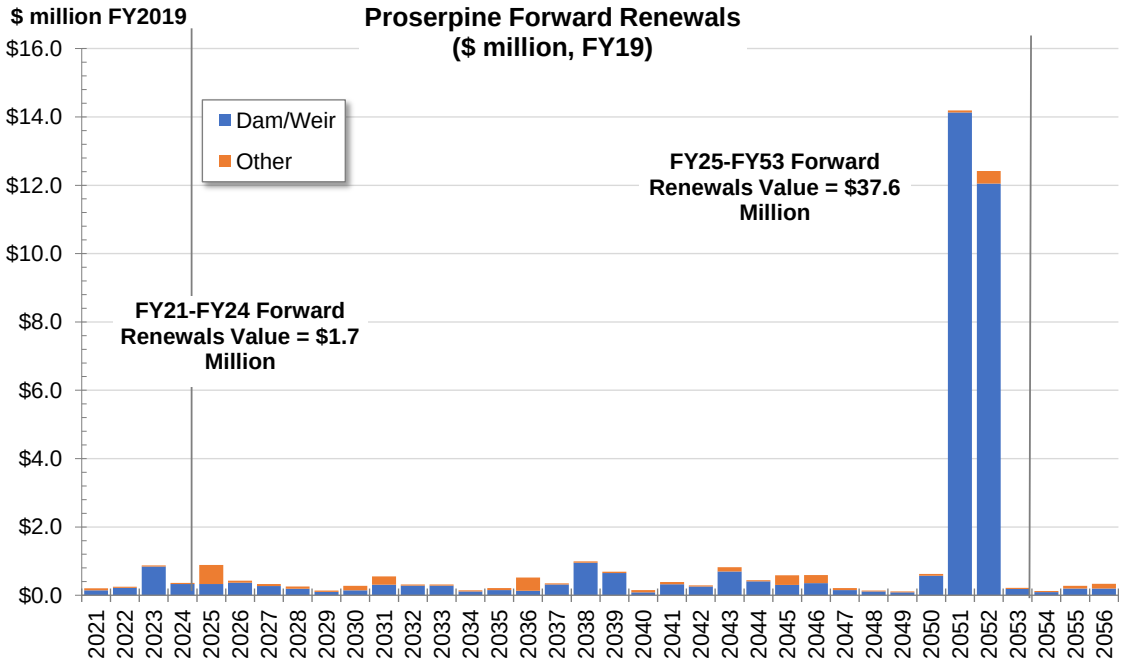

Figure 1

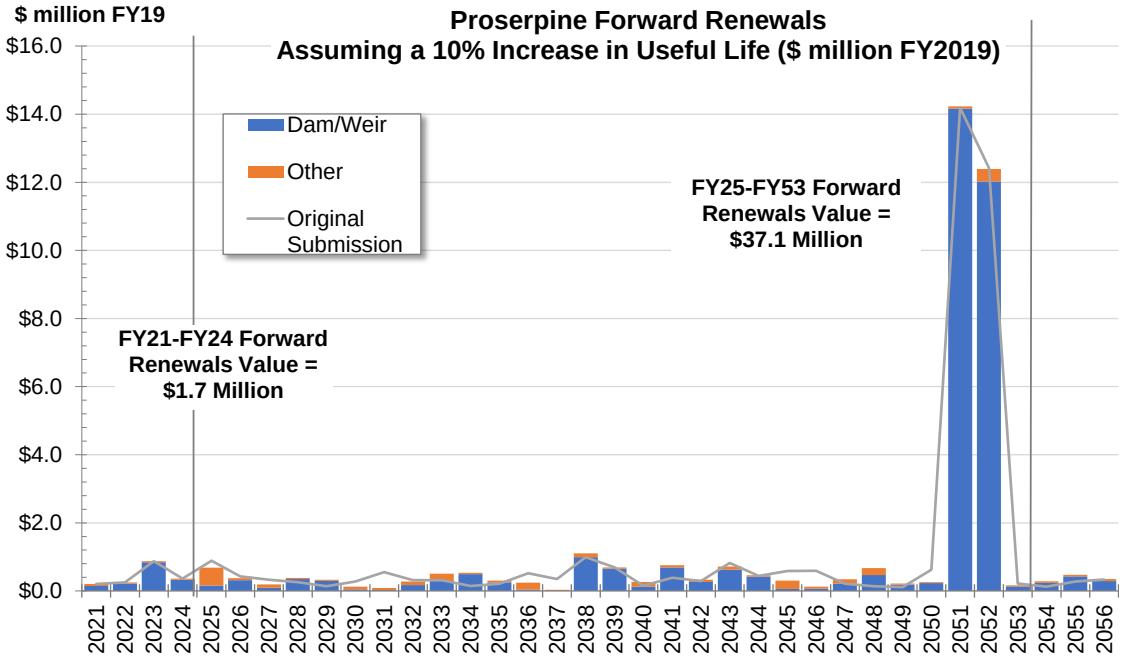

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.20	$0.20
2022	$0.25	$0.25
2023	$0.87	$0.87
2024	$0.36	$0.36
2025	$0.89	$0.68
2026	$0.43	$0.38
2027	$0.33	$0.19
2028	$0.25	$0.38
2029	$0.14	$0.33
2030	$0.28	$0.12
2031	$0.55	$0.09
2032	$0.32	$0.28
2033	$0.32	$0.51
2034	$0.15	$0.53
2035	$0.21	$0.31
2036	$0.52	$0.24
2037	$0.35	$0.03
2038	$0.99	$1.10
2039	$0.69	$0.69
2040	$0.15	$0.26
2041	$0.39	$0.76
2042	$0.29	$0.33
2043	$0.82	$0.72
2044	$0.44	$0.46
2045	$0.59	$0.30
2046	$0.59	$0.13
2047	$0.21	$0.35
2048	$0.14	$0.67
2049	$0.12	$0.22
2050	$0.62	$0.26
2051	$14.19	$14.23
2052	$12.42	$12.39
2053	$0.22	$0.17

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

20.0 St George bulk

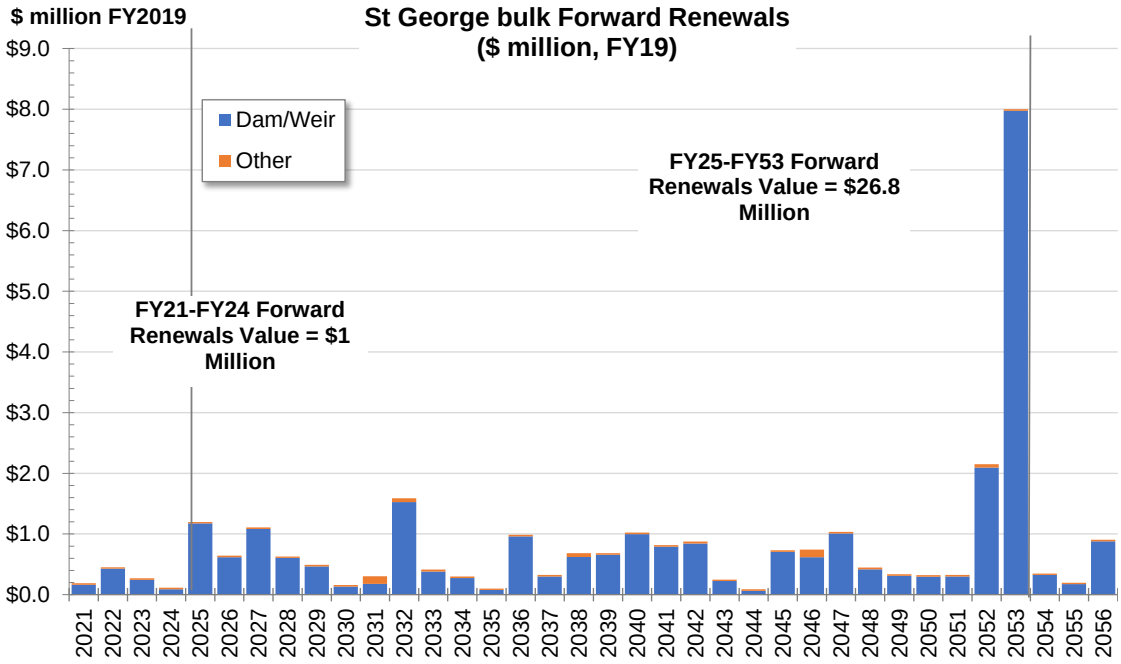

Figure 1

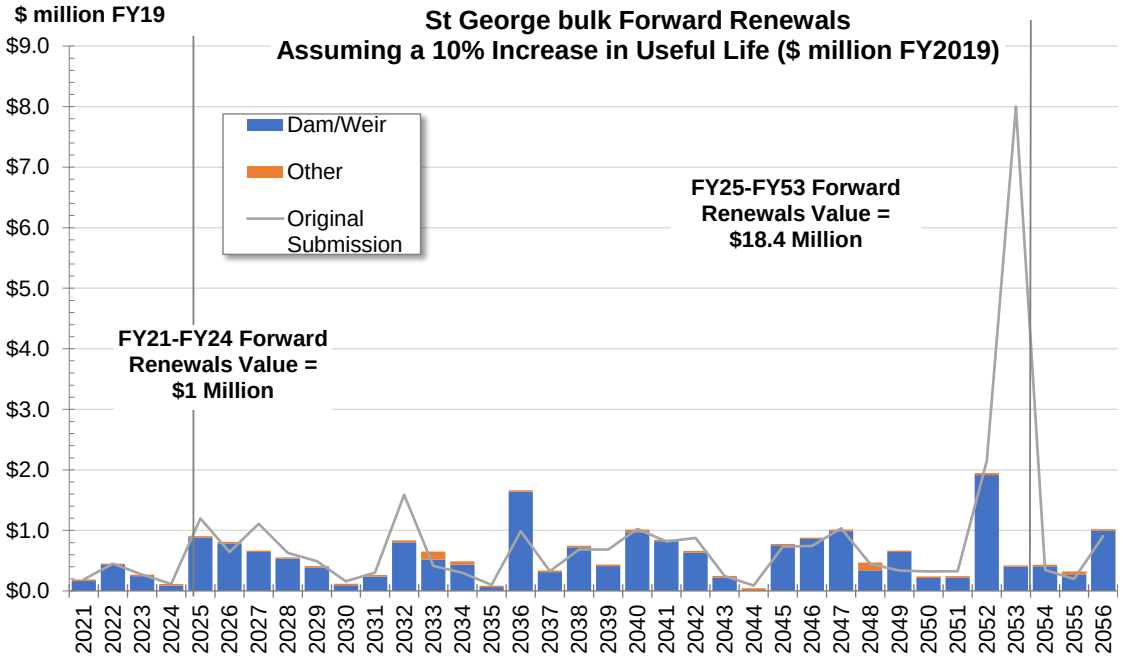

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.19	$0.19
2022	$0.45	$0.45
2023	$0.27	$0.27
2024	$0.12	$0.12
2025	$1.20	$0.91
2026	$0.64	$0.81
2027	$1.11	$0.67
2028	$0.63	$0.56
2029	$0.49	$0.41
2030	$0.16	$0.12
2031	$0.30	$0.26
2032	$1.59	$0.83
2033	$0.41	$0.65
2034	$0.30	$0.49
2035	$0.10	$0.09
2036	$0.99	$1.66
2037	$0.32	$0.34
2038	$0.68	$0.75
2039	$0.68	$0.44
2040	$1.02	$1.01
2041	$0.82	$0.85
2042	$0.88	$0.66
2043	$0.25	$0.25
2044	$0.09	$0.05
2045	$0.73	$0.78
2046	$0.74	$0.88
2047	$1.03	$1.01
2048	$0.45	$0.47
2049	$0.34	$0.66
2050	$0.32	$0.24
2051	$0.33	$0.24
2052	$2.15	$1.95
2053	$8.00	$0.42

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

21.0 Three Moon Creek

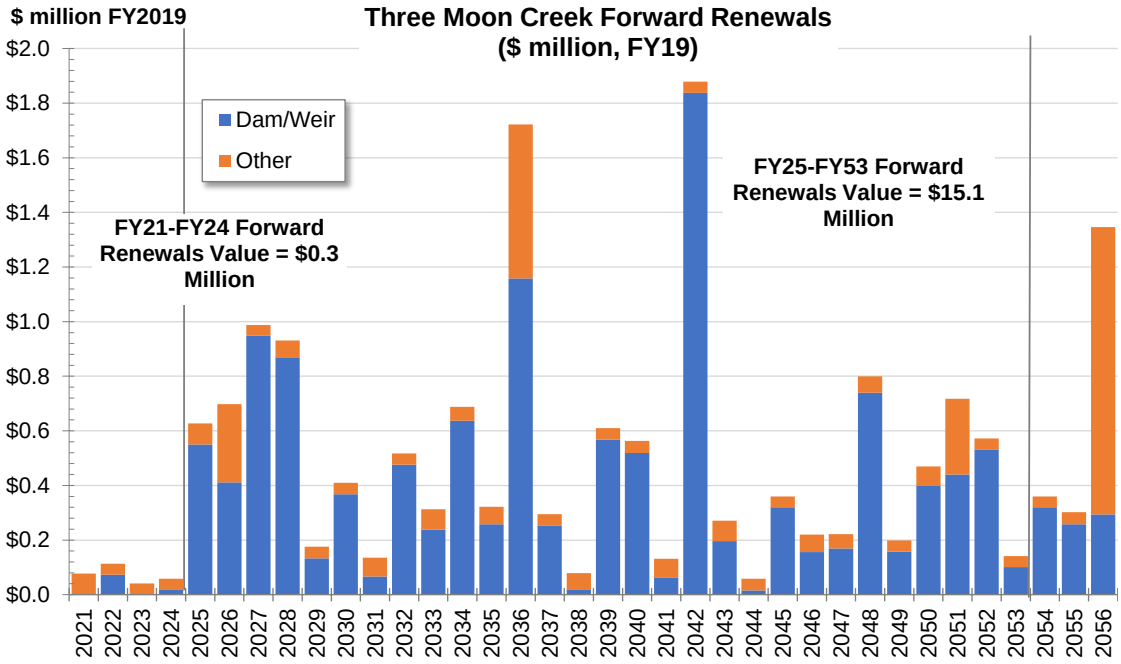

Figure 1

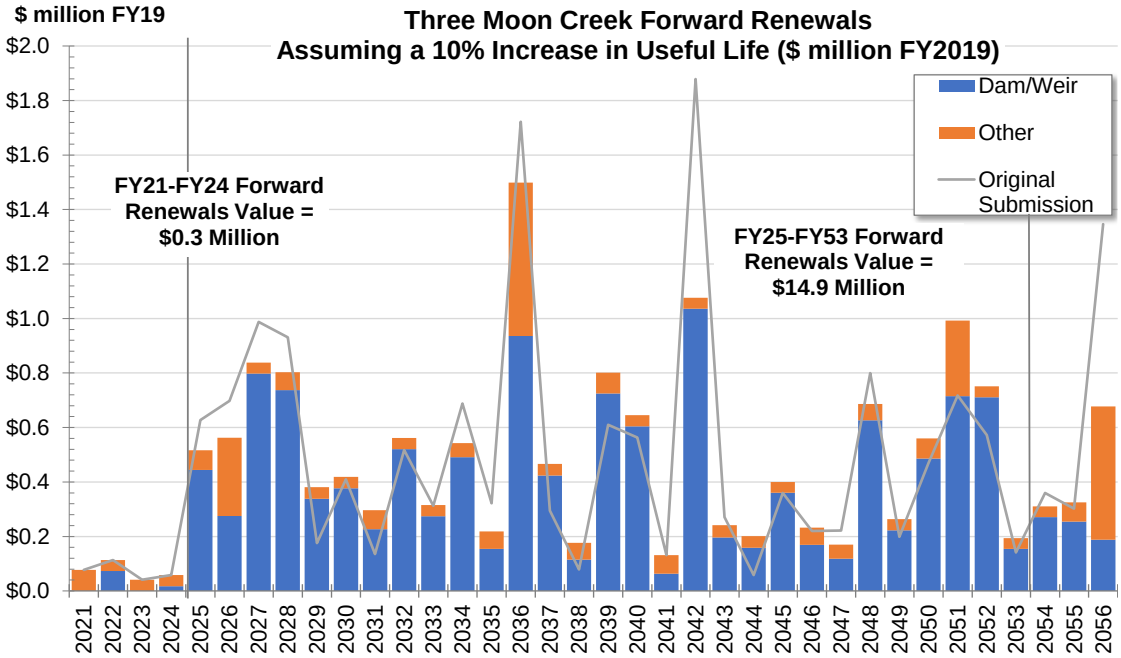

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.08	$0.08
2022	$0.11	$0.11
2023	$0.04	$0.04
2024	$0.06	$0.06
2025	$0.63	$0.52
2026	$0.70	$0.56
2027	$0.99	$0.84
2028	$0.93	$0.80
2029	$0.18	$0.38
2030	$0.41	$0.42
2031	$0.14	$0.30
2032	$0.52	$0.56
2033	$0.31	$0.32
2034	$0.69	$0.54
2035	$0.32	$0.22
2036	$1.72	$1.50
2037	$0.29	$0.47
2038	$0.08	$0.18
2039	$0.61	$0.80
2040	$0.56	$0.64
2041	$0.13	$0.13
2042	$1.88	$1.08
2043	$0.27	$0.24
2044	$0.06	$0.20
2045	$0.36	$0.40
2046	$0.22	$0.23
2047	$0.22	$0.17
2048	$0.80	$0.69
2049	$0.20	$0.26
2050	$0.47	$0.56
2051	$0.72	$0.99
2052	$0.57	$0.75
2053	$0.14	$0.19

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

22.0 Upper Burnett

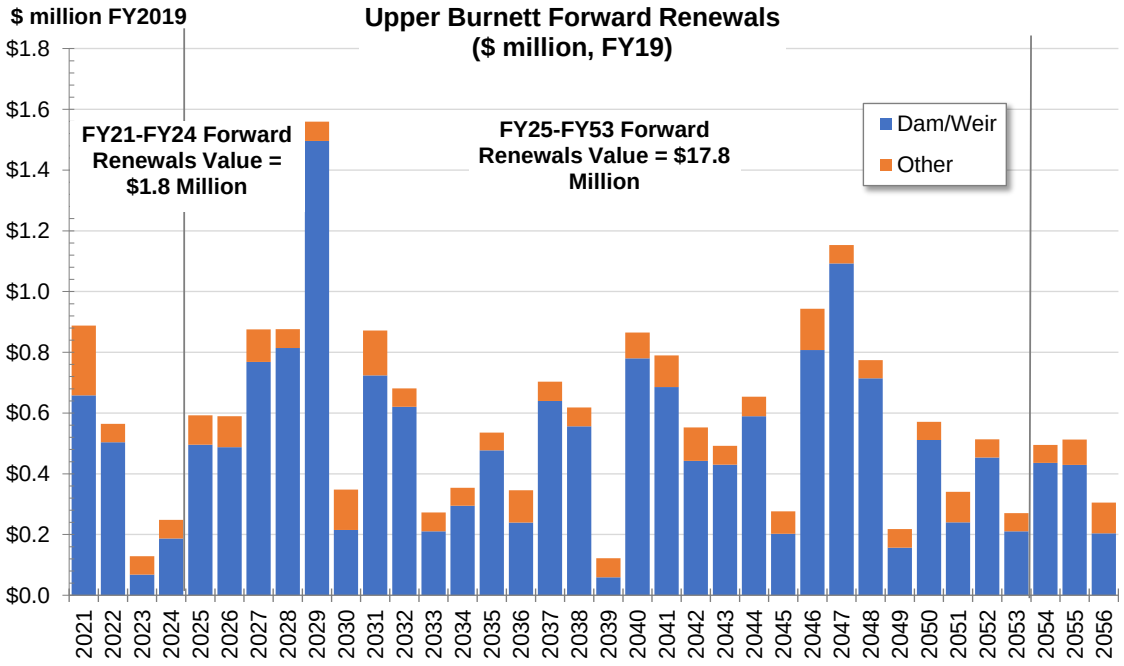

Figure 1

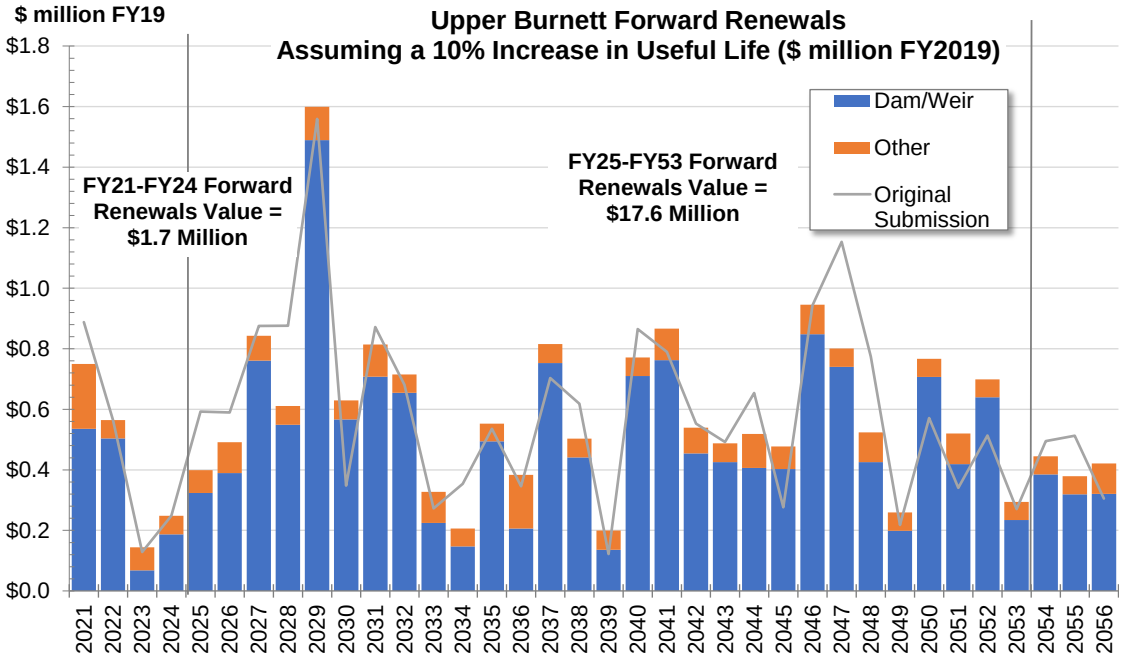

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.89	$0.75
2022	$0.56	$0.56
2023	$0.13	$0.14
2024	$0.25	$0.25
2025	$0.59	$0.40
2026	$0.59	$0.49
2027	$0.88	$0.84
2028	$0.88	$0.61
2029	$1.56	$1.60
2030	$0.35	$0.63
2031	$0.87	$0.81
2032	$0.68	$0.72
2033	$0.27	$0.33
2034	$0.35	$0.21
2035	$0.54	$0.55
2036	$0.35	$0.38
2037	$0.70	$0.82
2038	$0.62	$0.50
2039	$0.12	$0.20
2040	$0.87	$0.77
2041	$0.79	$0.87
2042	$0.55	$0.54
2043	$0.49	$0.49
2044	$0.65	$0.52
2045	$0.28	$0.48
2046	$0.94	$0.95
2047	$1.15	$0.80
2048	$0.77	$0.52
2049	$0.22	$0.26
2050	$0.57	$0.77
2051	$0.34	$0.52
2052	$0.51	$0.70
2053	$0.27	$0.29

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

23.0 Upper Condamine

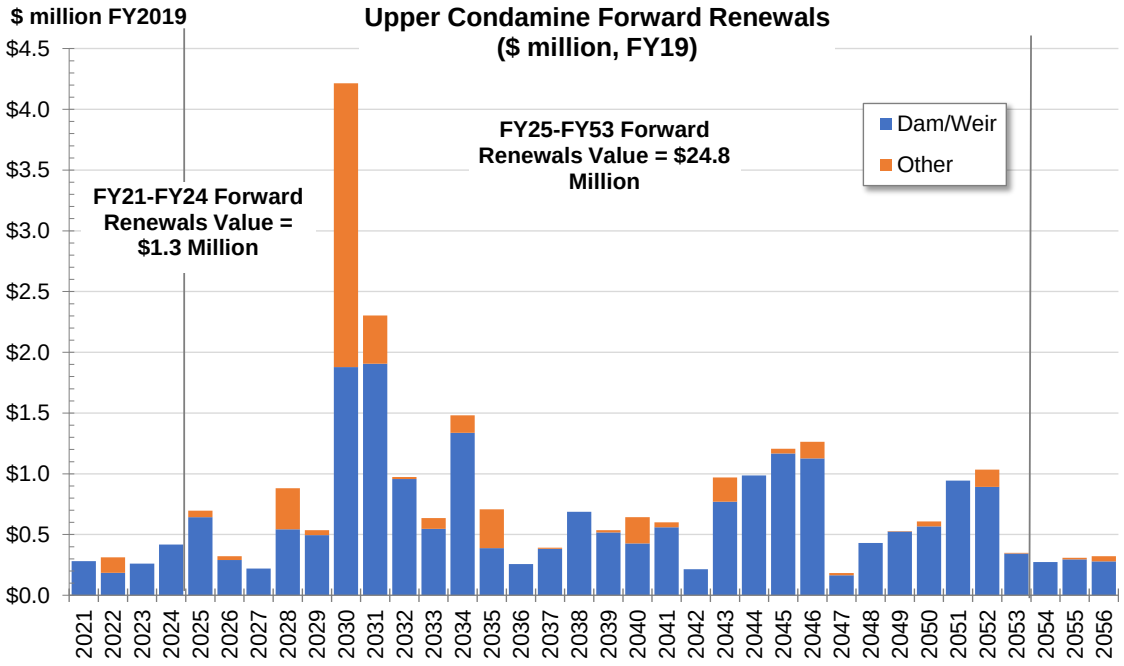

Figure 1

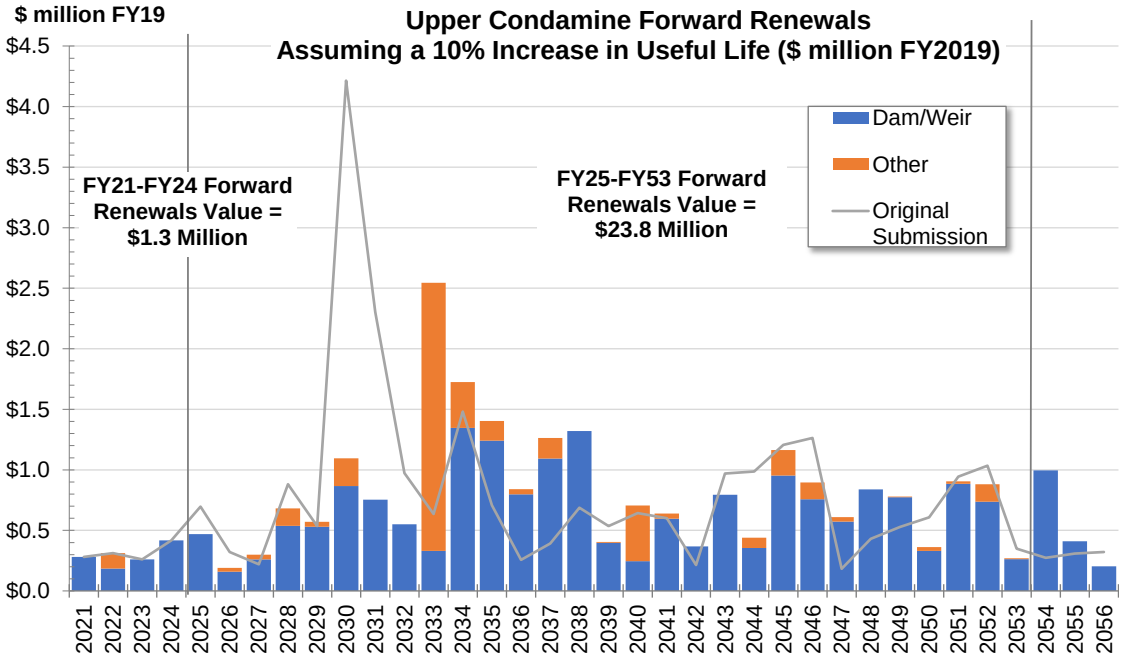

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.28	$0.28
2022	$0.31	$0.31
2023	$0.26	$0.26
2024	$0.42	$0.42
2025	$0.70	$0.47
2026	$0.32	$0.19
2027	$0.22	$0.30
2028	$0.88	$0.68
2029	$0.54	$0.57
2030	$4.21	$1.09
2031	$2.30	$0.75
2032	$0.97	$0.55
2033	$0.63	$2.55
2034	$1.48	$1.73
2035	$0.71	$1.40
2036	$0.26	$0.84
2037	$0.39	$1.26
2038	$0.69	$1.32
2039	$0.54	$0.41
2040	$0.64	$0.71
2041	$0.60	$0.64
2042	$0.21	$0.37
2043	$0.97	$0.79
2044	$0.99	$0.44
2045	$1.21	$1.16
2046	$1.26	$0.90
2047	$0.18	$0.61
2048	$0.43	$0.84
2049	$0.53	$0.78
2050	$0.61	$0.36
2051	$0.94	$0.90
2052	$1.03	$0.88
2053	$0.35	$0.27

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

24.0 Bundaberg distribution

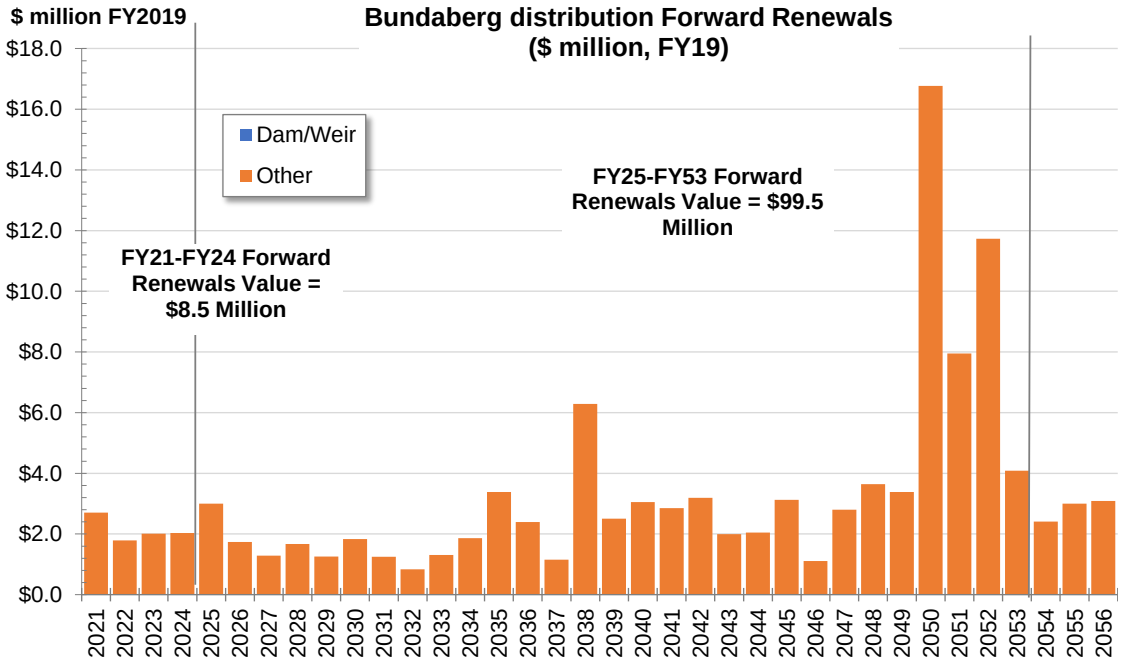

Figure 1

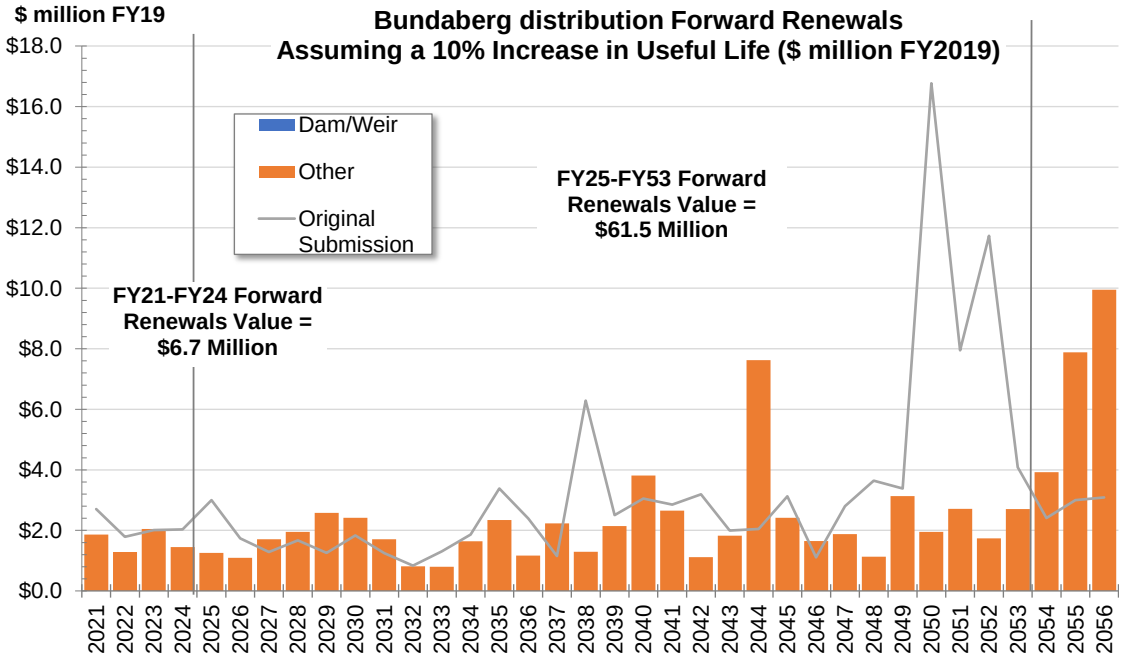

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$2.71	$1.86
2022	$1.79	$1.29
2023	$2.01	$2.05
2024	$2.03	$1.45
2025	$3.00	$1.26
2026	$1.74	$1.10
2027	$1.29	$1.71
2028	$1.67	$1.95
2029	$1.26	$2.58
2030	$1.83	$2.41
2031	$1.25	$1.71
2032	$0.84	$0.82
2033	$1.31	$0.80
2034	$1.86	$1.64
2035	$3.39	$2.34
2036	$2.40	$1.17
2037	$1.15	$2.23
2038	$6.29	$1.30
2039	$2.51	$2.14
2040	$3.05	$3.81
2041	$2.85	$2.66
2042	$3.20	$1.12
2043	$1.99	$1.83
2044	$2.05	$7.62
2045	$3.12	$2.42
2046	$1.11	$1.65
2047	$2.80	$1.88
2048	$3.65	$1.13
2049	$3.38	$3.13
2050	$16.77	$1.95
2051	$7.95	$2.71
2052	$11.73	$1.74
2053	$4.09	$2.70

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

25.0 Burdekin Haughton distribution

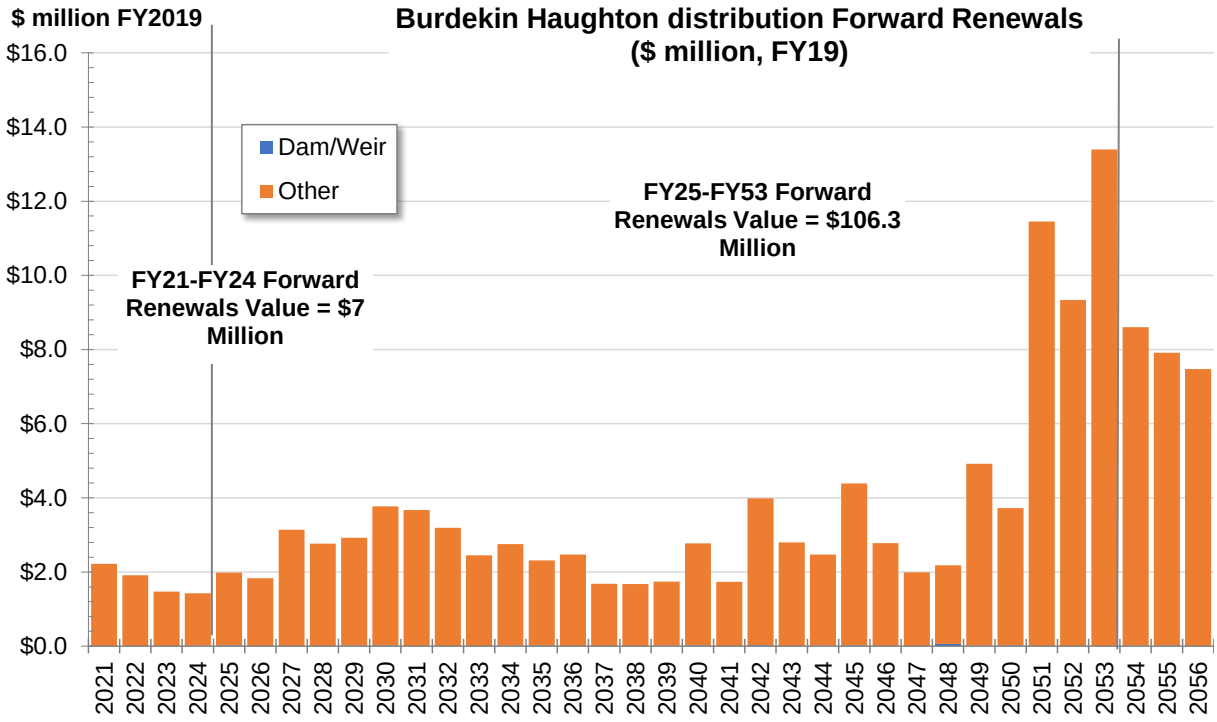

Figure 1

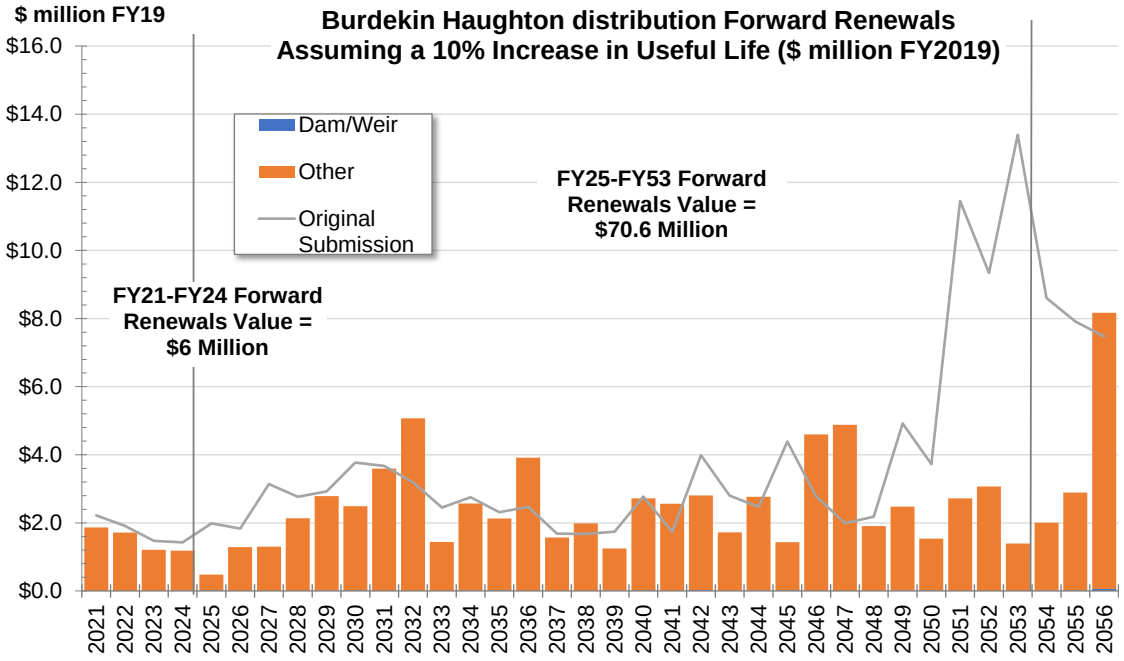

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$2.22	$1.86
2022	$1.91	$1.72
2023	$1.47	$1.21
2024	$1.43	$1.18
2025	$1.99	$0.48
2026	$1.83	$1.29
2027	$3.14	$1.30
2028	$2.76	$2.13
2029	$2.92	$2.79
2030	$3.77	$2.49
2031	$3.67	$3.59
2032	$3.19	$5.07
2033	$2.45	$1.44
2034	$2.75	$2.57
2035	$2.31	$2.13
2036	$2.47	$3.92
2037	$1.68	$1.57
2038	$1.67	$1.98
2039	$1.74	$1.25
2040	$2.77	$2.72
2041	$1.74	$2.56
2042	$3.99	$2.80
2043	$2.80	$1.72
2044	$2.47	$2.77
2045	$4.39	$1.43
2046	$2.78	$4.60
2047	$1.99	$4.88
2048	$2.18	$1.91
2049	$4.92	$2.48
2050	$3.72	$1.54
2051	$11.45	$2.72
2052	$9.34	$3.07
2053	$13.39	$1.39

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

26.0 Eton distribution

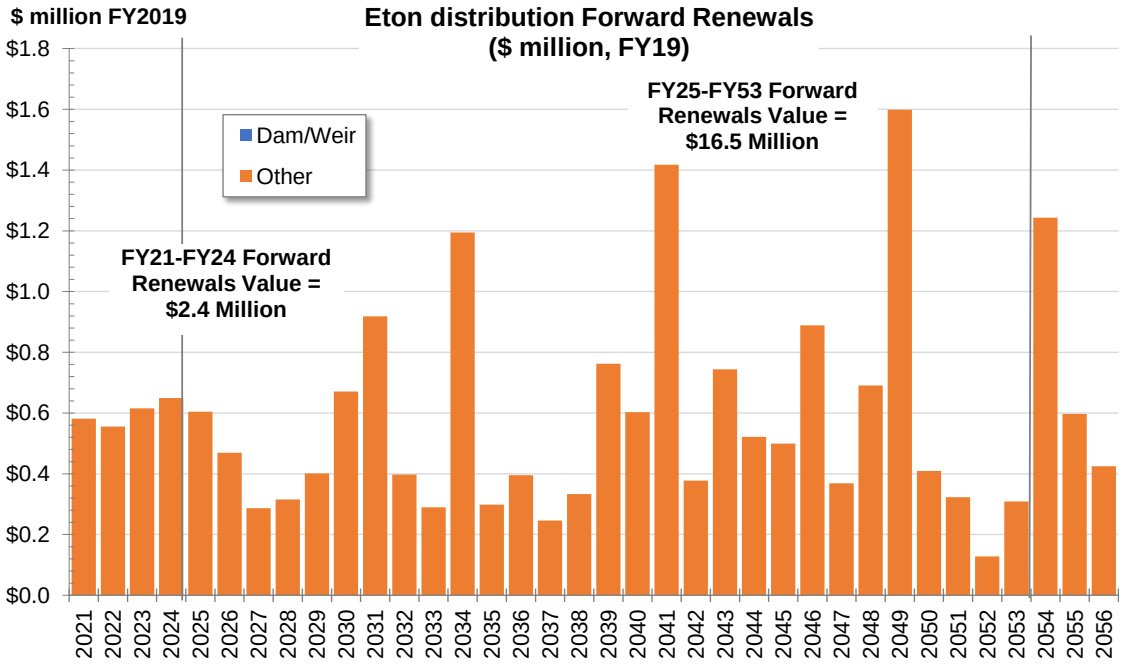

Figure 1

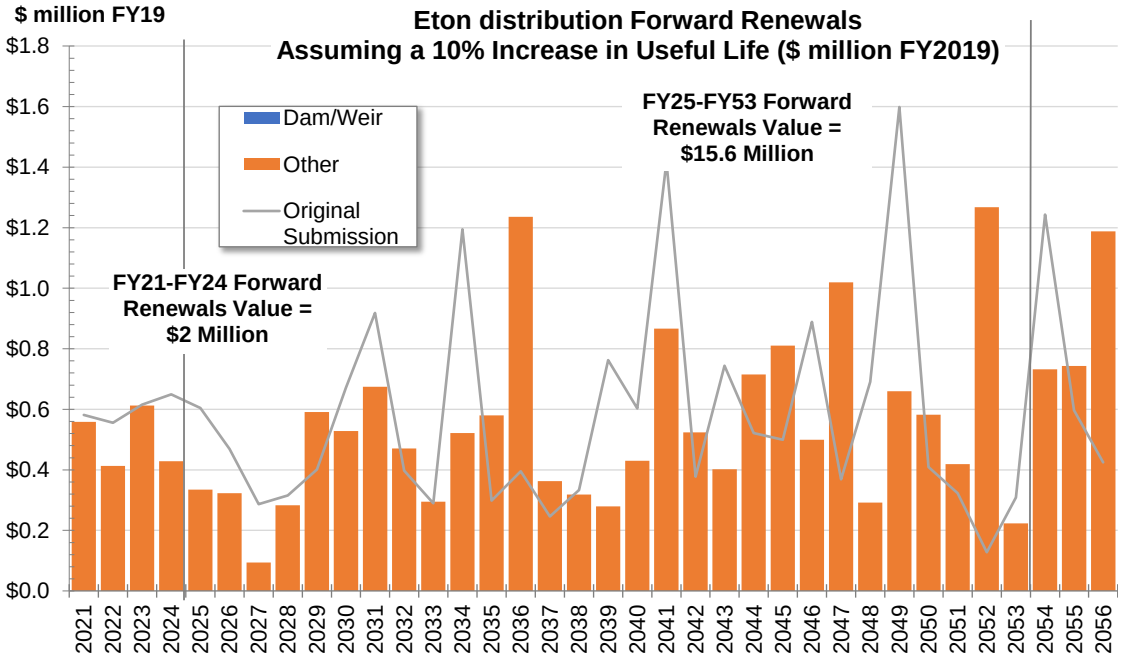

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.58	$0.56
2022	$0.56	$0.41
2023	$0.62	$0.61
2024	$0.65	$0.43
2025	$0.60	$0.33
2026	$0.47	$0.32
2027	$0.29	$0.09
2028	$0.32	$0.28
2029	$0.40	$0.59
2030	$0.67	$0.53
2031	$0.92	$0.67
2032	$0.40	$0.47
2033	$0.29	$0.29
2034	$1.19	$0.52
2035	$0.30	$0.58
2036	$0.40	$1.24
2037	$0.25	$0.36
2038	$0.33	$0.32
2039	$0.76	$0.28
2040	$0.60	$0.43
2041	$1.42	$0.87
2042	$0.38	$0.52
2043	$0.74	$0.40
2044	$0.52	$0.72
2045	$0.50	$0.81
2046	$0.89	$0.50
2047	$0.37	$1.02
2048	$0.69	$0.29
2049	$1.60	$0.66
2050	$0.41	$0.58
2051	$0.32	$0.42
2052	$0.13	$1.27
2053	$0.31	$0.22

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

27.0 Lower Mary River distribution

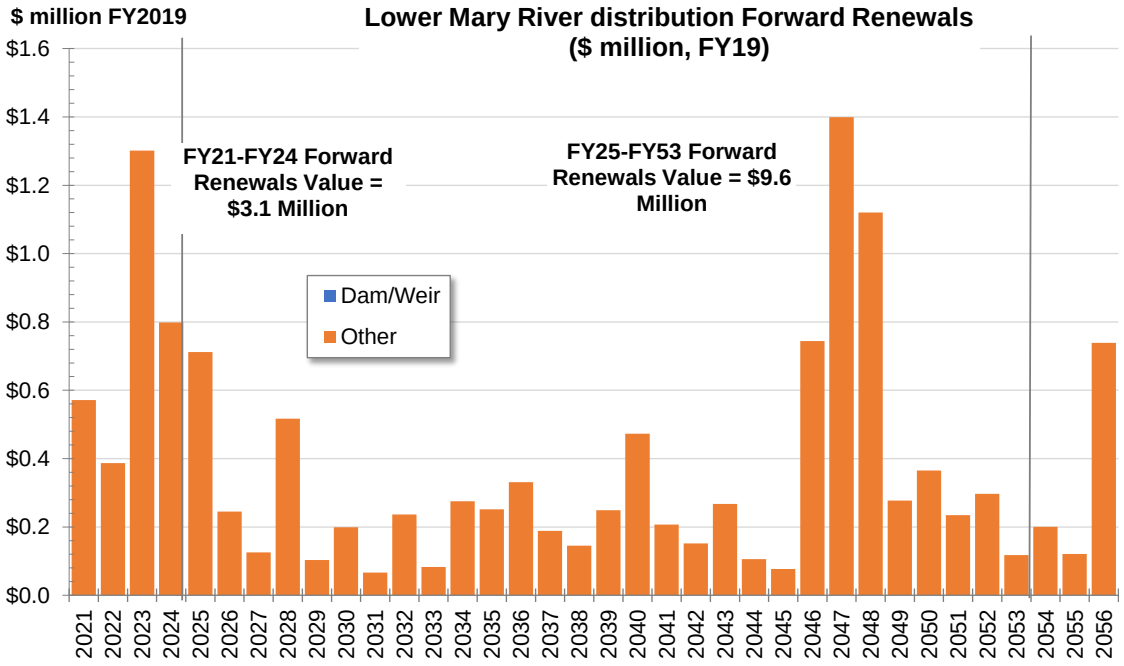

Figure 1

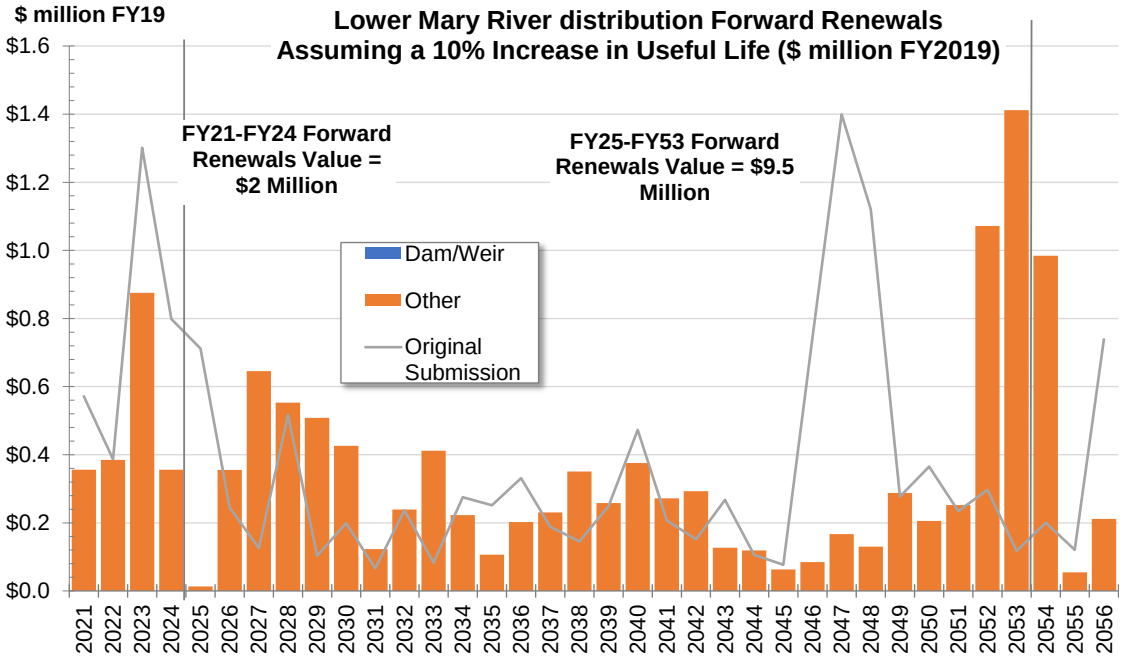

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$0.57	$0.36
2022	$0.39	$0.38
2023	$1.30	$0.88
2024	$0.80	$0.36
2025	$0.71	$0.01
2026	$0.24	$0.36
2027	$0.13	$0.65
2028	$0.52	$0.55
2029	$0.10	$0.51
2030	$0.20	$0.43
2031	$0.07	$0.12
2032	$0.24	$0.24
2033	$0.08	$0.41
2034	$0.28	$0.22
2035	$0.25	$0.11
2036	$0.33	$0.20
2037	$0.19	$0.23
2038	$0.15	$0.35
2039	$0.25	$0.26
2040	$0.47	$0.38
2041	$0.21	$0.27
2042	$0.15	$0.29
2043	$0.27	$0.13
2044	$0.11	$0.12
2045	$0.08	$0.06
2046	$0.74	$0.08
2047	$1.40	$0.17
2048	$1.12	$0.13
2049	$0.28	$0.29
2050	$0.37	$0.21
2051	$0.23	$0.25
2052	$0.30	$1.07
2053	$0.12	$1.41

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

28.0 Mareeba-Dimbulah distribution

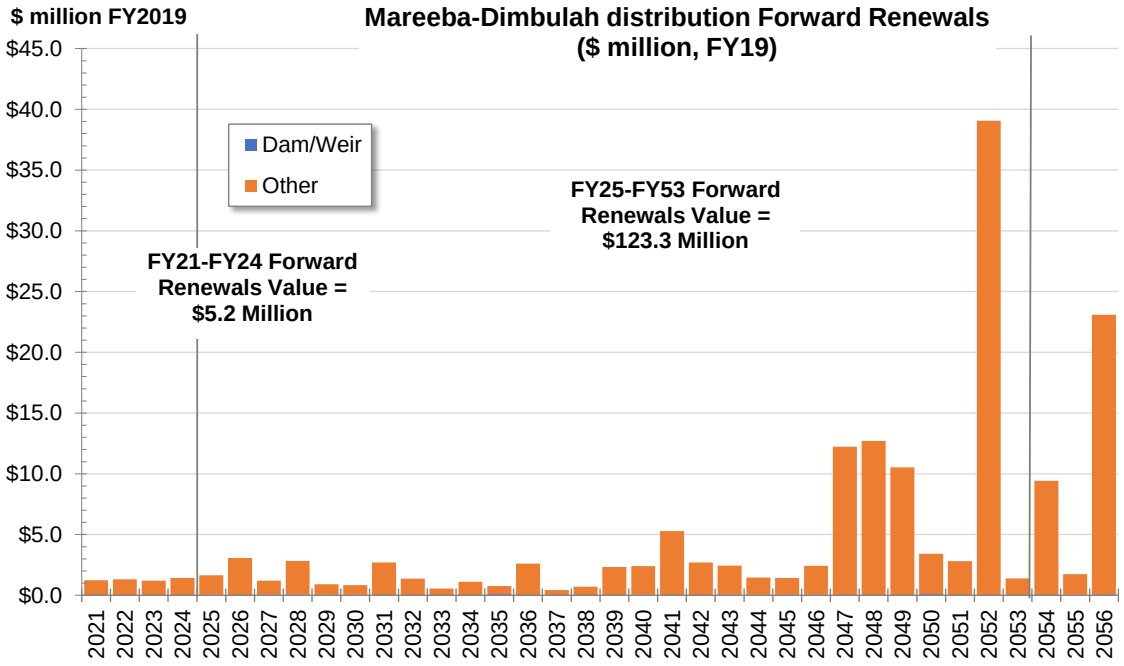

Figure 1

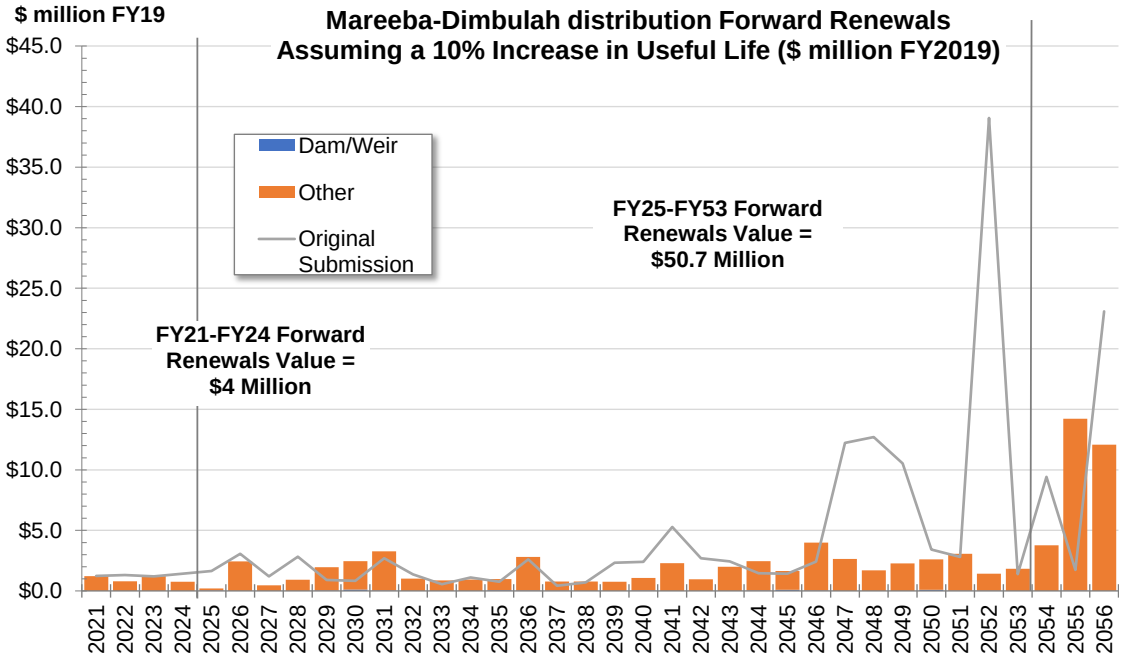

Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

	Project Value ($ million, FY19)	
Financial Year	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	$1.25	$1.23
2022	$1.32	$0.79
2023	$1.21	$1.21
2024	$1.43	$0.77
2025	$1.65	$0.20
2026	$3.06	$2.45
2027	$1.20	$0.47
2028	$2.84	$0.93
2029	$0.91	$1.96
2030	$0.83	$2.47
2031	$2.71	$3.27
2032	$1.36	$1.02
2033	$0.56	$0.87
2034	$1.12	$0.94
2035	$0.75	$0.98
2036	$2.61	$2.81
2037	$0.43	$0.77
2038	$0.70	$0.77
2039	$2.33	$0.76
2040	$2.40	$1.07
2041	$5.28	$2.30
2042	$2.69	$0.97
2043	$2.45	$2.00
2044	$1.47	$2.45
2045	$1.43	$1.65
2046	$2.43	$3.98
2047	$12.23	$2.65
2048	$12.70	$1.71
2049	$10.53	$2.27
2050	$3.42	$2.61
2051	$2.81	$3.07
2052	$39.05	$1.43
2053	$1.39	$1.83

Appendix D

Project Reviews for Dam Safety Upgrades

AECOM Imagine it. Delivered.

Burdekin Falls Dam Safety Improvement Project

Project Overview

Burdekin Falls Dam upgrade works are deemed essential by Sunwater as the F-N plot shows that the risk is currently greater than the ANCOLD Limit of Tolerability for Existing Dams. Risk reduction is mandatory in accordance with regulatory requirements. The scope of works of the dam safety improvement project is to upgrade the dam to achieve 100% of the Acceptable Flood Capacity (AFC). The project is currently at concept design phase.

Summary of Findings

Review Summary				
	Prudent	✓	Scope	✓
			Standard	✓
			Cost	✓

Capital expenditure claim (FY19$)	FY19-20: $12.7M FY21-24: $284M FY25: $35.1M
Impact of findings on claim (FY19$)	FY19-20: $0 FY21-24: $0 FY25: $0
Total Accepted (FY19$)	FY19-20: $12.7M FY21-24: $284M FY25: $35.1M

Background

Burdekin Falls Dam (BFD) comprises of a mass concrete gravity main dam and four earth and rockfill saddle dams. It was completed in 1987 and stores 1,860,000 ML of water at the full supply level of EL1540.0 AHD. It is the largest water storage dam in Queensland. The dam supplies water to urban areas such as Townsville, Ayr, Home Hill and water for the Burdekin River Irrigation Area and the industrial development in lower Burdekin.

As a result of revised rainfall and flood estimates by the Bureau of Meteorology, more extreme rainfall events in the BFD catchment is now expected compared to values used for the dam's original design. The standard design requirement, the Probable Maximum Precipitation Design Flood (PMPDF) for the dam, has increased since it was initially designed and constructed. Consequently, BFD does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC). Engineering works undertaken in 2017 shows the F-N of Burdekin Falls Dam is presently above the ANCOLD Limit of Tolerability for Existing Dams. The main studies to inform the risk assessment, position of the F-N curve and concept design options and costings have been undertaken.

Based on the 2019 revised hydrology assessment and the current capacity of Burdekin Falls Dam, the risk posed to the downstream population remains unacceptable. In accordance with Sunwater's Dam Safety Policy, the dam must be upgraded so that:

- BFD can safely pass 100% of the AFC spillway flow to meet the Dam Safety Regulator's and ANCOLD's Guidelines
- the current societal and individual risk posed by failure of BFD is reduced to below the Limit of Tolerability as soon as possible

- Sunwater can discharge its obligations towards safety as soon as possible in accordance with the organisation's own Dam Safety Policy and prioritisation process (Sunwater is committed to completing the improvement works by October 2024).

Drafts have been developed for the concept engineering report and preliminary business case.

Options Assessment

Sunwater engaged [redacted] to develop the Concept Engineering Report (November 2018). The options development process identified 10 potential options. The options were:

- 1A. Upgrade main dam and saddle dams to the 2008 Hydrology peak water levels
- 1B. Upgrade main dam and saddle dams to the 2017 Hydrology peak water levels
- 2A. Development of a new auxiliary spillway downstream of the Left Bank Saddle dam
- 2B. Use existing Left Bank Saddle dam and install spillway gates
- 2C. Development of a new auxiliary spillway downstream of the Left Bank Saddle dam, install spillway gates
- 3. Use Mount Graham North and South Saddle dams and install fuse plugs
- 4A. Development of a new Right Bank Auxiliary spillway (Main dam and saddle dams to be upgraded
- 4B. Lowering of existing Right Abutment to form auxiliary spillway (Main dam and saddle dams to be upgraded)
- 5A. Reduce the crest level of existing ogee crest (reduce Full Supply Level)
- 5B. Install spillway gates into existing ogre crest

A "do nothing" option base case was part of the option evaluation for completeness but was not shortlisted. The "do nothing" option presented an unacceptable risk and Sunwater would be breaching their regulatory requirements.

The options were assessed using multicriteria assessment and industry-based risk assessment. The criteria were collaboratively developed with Sunwater. The criteria and their weightings were:

1. Capital Cost (20.9%)
2. Delivery Risk and Issues (18.2%)
3. Dam Safety and Capacity (16.7%)
4. Asset Management and Operations (13.2%)
5. Future-Proofing: Impact on Future Dam Raise (13.1%)
6. Customer Stakeholder and Property Impacts (11.3%)
7. Environment and Approval Impacts (6.6%)

From the original options list, four options were short listed: 2A, 2C, 1A, and 1B. Of these, two (1B and 2A). were chosen as the preferred options. Option 2A (Development of a new auxiliary spillway downstream of the Left Bank Saddle dam) was given slight preference but was to be reviewed following receipt of updated hydrology. Option 2A satisfied the 100% of the AFC requirement for 2017 hydrology, it prevented constructability risks associated with working on the main dam spillway crest, and it allowed for a future 2m dam raise without any work on the saddle dams. Its only concern was customer and stakeholder impacts as the works partially extended onto private property.

In April 2019, the concept design report was revised (in draft) to account for the revised 2019 hydrology assessment and the 2019 F-N plots. Further options were developed based on a "risk based" AFC that could address Dam Safety risk and bring risks below the line of tolerability and meet ALARP criteria. The new options were variants of the original Option 1, based on reinforcing and raising the existing dam to meet various flood levels. Each option had an incremental number of anchors applied to the spillway block. The options were:

- 1C. Two anchors per spillway block, design lake level RL 173.8m AHD

- 1D. Three anchors per spillway block, design lake level RL 175.9m AHD
- 1E. Three anchors most spillway blocks, four anchors on seven spillway blocks with lower foundation levels, design lake level RL 176.6m AHD

The new options were compared against the original preferred Option 2A. A new assessment criterion was also added, termed 'Good Practice and Precedent' referring to the degree the solution has been implemented successfully elsewhere thus providing certainty that benefits would be achieved. Weightings for other categories were also revised. The value of Dam Safety and Capacity was now deemed the most important criteria. Future-Proofing was de-prioritised to the least important. The new weightings were:

1. Dam Safety and Capacity (20.1%)
2. Capital Cost (17.8%)
3. Delivery Risk and Issues (16.6%)
4. Good Practice and Precedent (14.7%)
5. Asset Management and Operations (6.2%)
6. Customer Stakeholder and Property Impacts (9.3%)
7. Environment and Approval Impacts (9.7%)
8. Future-Proofing: Impact on Future Dam Raise (5.6%)

Following the weighted options assessment scoring, all three new options scored higher than Option 2A. Option 1C was selected as the new preferred option with a score (range 1-5) of 3.5 compared to Option 2A at 2.8. It should be noted that the new criterion of 'Good Practice and Precedent' was scored equally across all options so its inclusion is unlikely to have altered the scoring of the initial 10 options. The criteria that drove selection of Option 1C were capital cost and delivery risk.

The selection of the preferred option was considered prudent as Option 1C was the least cost option that met technical requirements using a risk-based approach. Appropriate multicriteria assessment was used in concluding the preferred option.

Implementation

Class 5 level cost estimates have been undertaken for all options ([redacted] 2018 & 2019) and are reasonable for the current level of design. There are appropriate inclusions for indirect costs such as contractor costs and insurance (21.5%), unlisted items (10%), owner costs, contingency and project risk (30%). The basis of estimate used information available from Sunwater and available rates from databases and other knowledge to form the opinion of probable construction cost (OPCC). The OPCC are provided with a low end range of -10% and a high end range of +40%. The two original shortlisted options 1B and 2A were costed at $469M and $509M respectively (both in $FY18). The new preferred option (Option 1C) was costed at $336M. In $FY19, this is $341M.

The revised concept design report also uses Monte Carlo analysis to generate a risk-adjusted median cost for the new options. Option 1C was $351M and Option 2A was $523M. These costs were qualified by stating they are based on the Class 5 Estimate with a qualitative risk analysis only, and would need to be revisited once the risk register has been reviewed and risks quantified. It appears that they have not been used in establishing the project cost estimate.

An initial Preliminary Business Case for the Burdekin Falls Saddle Dam and Spillway Monolith Improvement Project was approved by Sunwater Board in March 2017. Due to the revised 2019 flood hydrology and extreme rainfall probabilities, Sunwater recommenced the Burdekin Falls Improvement Project Preliminary Business Case process based on the revised 2019 Concept Design Report. A draft version of this document has been provided but is noted to be awaiting further revisions.

The draft Preliminary Business Case (April 2019) proposed a capital expenditure profile (excluding inflation and escalation) in $FY20 terms, with data sourced from the Concept Design Report. Table 1 shows this profile. For the purpose of this review, the table includes a second row to show the amounts converted to $FY19, as well as groupings for the proposed time periods. The total of $346M (in $FY19) differs from the Concept Design Report estimate of $341M. There is no supporting documentation to explain the slight difference, but as this is the most recent corroborated cost data, it is assumed as the most representative estimate of total project cost.

Table 1 Business Case Capital Expenditure Profile for Option 1C ($000)

	Transitional		Price Path Period				Beyond Price Path	
	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
$FY20	10,917	36,602	66,516	85,936	75,190	48,147	29,769	353,079[1]
$FY19	10,703	35,884	65,212	84,251	73,716	47,204	29,186	346,156
Total per Period ($FY19)	46,587		270,383				29,185	346,156

Notes:

1) The sum of the individual years sum to $353,079,432 as opposed to $352,550,369 as reported in the Business Case.

The Appendix D of the Preliminary Business Case provides expected timelines for the project development and implementation phases of the project. It was proposed that:

- the Detailed Business Case be completed and approved by November 2019[1]
- detailed design being completed in January 2021
- construction will be completed by July 2024
- project handover by October 2024

Appendix D also provided a breakdown of the project development phase costs. They are assumed as presented in nominal $, and are presented in Table 2. The total is $8.9M, which would primarily be incurred in FY19 and FY20.

Table 2 Project Development Costs ($Nominal)

Activity	Budget
Evaluation Phase (revised Prelim Business Case)	**$3,373,000**
Detailed Hydrology (AEP, hydrology, hydraulic)	$750,000
Comprehensive Risk Assessment (CRA)	$240,000
Engineering - Concept & Preliminary	$1,350,000
Approvals	$37,000
Business Case - Preliminary	$346,000
Procurement	$50,000
Project Mgt, Controls, Communication	$600,000
Planning Phase (revised Detail Business Case)	**$3,591,000**
Geotechnical, Survey & Supporting Investigations	$1,632,000
Engineering - Preliminary	$589,000
Business Case - Detail	$921,000
Procurement	$100,000
Project Mgt, Controls, Communication	$350,000
Execution (early Detail Design, Procure, Construct Plan)	**$2,000,000**
Engineering - Detail	1,500,000
Pre-Construction Readiness / Early Works (internal)	200,000
Pre-Construction Readiness / Early Works (external)	300,000

These FY19 and FY20 costs do no align with the capital expenditure profile in the main body of the document, which states that approximately $46M would be spent in FY19 and FY20.

[1] Sunwater advised that November 2019 date is for Sunwater Board and Building Queensland approval. The detailed business case also requires approval by the Shareholding Minister (March 2020).

Another cost discrepancy exists with the revised Dam Safety Upgrade Capital Expenditure summary that was provided by Sunwater on 3 July 2019 in response to QCA RFI 58. The total is $332M (in $FY19), which doesn't match any of the previous estimates. Furthermore, the annual spend profile differs from that in the preliminary business case. The annual expenditure breakdown is provided in Table 3.

Table 3 Spillway & Saddle Dam Improvement Annual Capital Expenditure ($000)

	Transitional		Price Path Period				Beyond Price Path	Total
	FY19[1]	FY20	FY21	FY22	FY23	FY24	FY25	-
Annual ($ Nominal)	6,778	6,048	11,103	90,161	108,840	100,247	40,280	363,456
Total per Period ($ Nominal)	12,825		310,350				40,280	363,456
Annual ($FY19)	6,778	5,929	10,633	84,347	99,465	89,491	35,082	331,724
Total per Period $FY19)	12,707		283,936				35,028	331,724

Notes:

1) The FY19 costs represent the column titled 'Cumulative' in the spreadsheet. They are assumed as FY19 costs since the FY18 column is blank.

The proposed capital expenditure from the RFI 58 has been considered as Sunwater's final expenditure claim. The total is $332M (in $FY19) and is less than the figures specified in the Conceptual Design Report of $341M (in $FY19) and the draft Preliminary Business Case of $346M (in $FY19). The RFI 58 annual expenditure profile has also been modified to push out costs from the transitional years to later years. The bulk of construction costs appear to now be starting in FY22. This mirrors the indicative schedule presented in Appendix D of the preliminary business case.

The spend profile appears more reasonable in the RFI 58. Furthermore, the total project cost has been decreased by $15M above what was stated in the Preliminary Business Case. While there is no evidence to support the decrease, it appears Sunwater has made attempts to improve cost efficiency.

Note that these costs have been confirmed to be related to construction of the new Option 1C and not related to legacy costs for repairing and maintaining the existing dam.

Findings

- Prudency:

  This project is deemed prudent as the dam is currently operating at an intolerable risk as per the ANCOLD Limit of Tolerability for Existing Dams. It is a regulatory requirement to undertake works to reduce the risk. The documentation in relation to justifying the prudency of the project was of high quality and provided a clear technical basis for the dam safety improvements.

- Efficiency:

  The level of documentation quality for the project is high. The Concept Design Report and Preliminary Business Case provide detailed assessment of options, scope, risk, cost, etc. The project is deemed as efficient in scope, standard, and efficiency. As the project is only at concept design stage, the cost estimates are high level concept and have been undertaken according to AACE guidelines and using information provided by Sunwater. The costs have been stated to be within an accuracy of -10% to +40%. This is more accurate than the level specified in Sunwater's cost estimate process for the preferred option concept design (+/-75%)[2]. The total project cost claim is less than the cost estimate presented in the Preliminary Business Case and therefore assumed efficient.

[2] QCA RfI A3 – Cost Estimation Process and the referenced Attachment 4 AM11_F02

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Fairbairn Dam Safety Improvement Project

Project Overview

The Fairbairn Dam Safety Improvement Project was initiated in 2015 following the observation of seepage through the joints in the concrete slabs of the spillway during a five-yearly inspection in 2014 and early 2015. Without rectification, the assessed risk profiling rating of Fairbairn Dam was increased to above the acceptable limit of tolerability in accordance with the Australian National Committee of Large Dams (ANCOLD). Works to rectify the critical risks to the dam's spillway stability have been implemented in three stages, with the final two stages of this project ongoing until 2021. The safety improvement works are essential to satisfy regulatory requirements regarding risk reduction.

Summary of Findings

Review Summary

Prudent	✓

Scope	✓
Standard	✓
Cost	✓

Capital expenditure claim (FY19$)	FY16-20: $147M FY21: $21.0M
Impact of findings on claim (FY19$)	FY16-20: $0 FY21: $0
Total Accepted (FY19$)	FY16-20: $147M FY21: $21.0M

Background

Fairbairn Dam is located on the Nogoa River approximately 17 km south-west of Emerald. The dam consists of a main embankment and six saddle dams. The dam has a storage capacity of 1,304,115 ML at full supply EL 204.23 m AHD. It has a 163.07 m long uncontrolled, spillway crest. Saddle Dams 2, 3 and 4 have a crest level of 218.86 m AHD. Saddle Dams 1, 5 and 6 have a crest level of 217.94 m AHD, 0.92 m lower than the main dam.

The Portfolio Risk Assessment was initiated in June 2007 and has been regularly updated, with the latest version 7 in September 2018. The document provides a consolidation of the latest findings from comprehensive risk assessments and other relevant documents for each storage within the referable storages portfolio. The document describes various inspections, surveys, tests, and risk assessments that were completed from 2009 to 2017. Voids and subsurface drainage issues have led to the corrosion of anchors that presents a risk of uplift or transient pressures on the concrete slabs during flood events, which could in turn dislodge the concrete slabs and expose the foundation.

In accordance with the Queensland Dam Safety Regulator's and ANCOLD's Guidelines (Limit of Tolerability), the societal risk posed by Fairbairn Dam in its pre-Project state was unacceptable. That is, due to the identified deficiencies to the spillway, Fairbairn Dam is exposed to a higher risk of dam failure (during a flood event) than desirable. This is an issue that requires addressing as soon as practicable. The follow-on effects of a potential dam failure include significant loss of life and property damage to communities downstream of the dam, ongoing loss of regional water supply impacting commercial sustainability within the region, as well as the financial, reputational and legal implications to Sunwater's business. The Portfolio Risk Assessment and other project risk assessments identify the F-N is presently above ANCOLD Limit of Tolerability for Existing Dams and upgrade works are required to reduce this risk

Dam safety obligations fall under regulatory requirements. Under the Water Supply (Safety and Reliability) Act 2008, dams are required to be maintained to reduce risk of dam failure and

consequential loss in line with Queensland's independent Dam Safety Regulator (DNRME), and relevant national (ANCOLD) and international guidelines.

As the dam owner, Sunwater has clear legal obligations to ensure the structural and operational integrity of its facilities and the safety of downstream communities. To ensure that this obligation is properly discharged, Sunwater utilises and has in place a Comprehensive Dam Safety Management Program (CDSMP) which adopts the standards and guidelines as stipulated by the Queensland Dam Safety Regulator and as recommended by ANCOLD.

The project has been split into stages to address the highest risk elements (at least what was considered to be at the outset of the project in FY15) prior to the imminent wet season in FY17. There are three stages to the project. Stage 1 was the immediate works required to reduce risk for the FY17 wet season. Those works were completed in December 2016. Since the Stage 1 project was commenced, additional investigations have been carried out into the substructure condition, which has presented additional intolerable risk elements. The Stage 2 and Stage 3 works are ongoing to continue to reduce the risk to tolerable in accordance with the guidelines.

Options Assessment

The February 2016 Business Case describes four options that were considered in a preliminary option assessment for the Fairbairn Dam Spillway Improvement Project. They include:

1. Do nothing
2. Implement improvement works on the existing spillway
3. Construct a secondary spillway
4. Drain and / or decommission Fairbairn Dam

The options were assessed against an MCA framework with weighted criteria including Addressing the Need (50%), Timing (20%), Net Cost (15%), and Project Delivery & Operational Risks (15%). The preferred option was Option 2 to implement improvement works on the existing spillway.

Option 2 was then further developed, and four different improvement options were defined. In the Business Case (Update) dated 19 July 2016, the following were considered in the detailed options analysis:

1. Option 1 – Do nothing
2. Option 2A – Partial repair of the 2:1 spillway portion
3. Option 2B – Full repair of the 2:1 spillway portion
4. Option 2C – Full repair of the spillway
5. Option 2D – Full repair of the spillway via staged delivery

The options were assessed with an MCA framework. The outcome of the detailed options assessment is the preferred implementation of Option 2D, which met all the proposed project objectives including to reduce operational risk profile prior to the FY17 wet season, lower project delivery risks, and optimisation of capital expenditure.

The staged delivery proposes a focus on repairs to high risk deficiencies in order of descending risk. Progressive improvements and risk reduction would be achieved at the earliest opportunity while the overall scope and timing could be reviewed and adjusted as needed. Two stages were originally proposed. Stage 1 would be implemented in 2016 prior to the FY17 wet season. Stage 2 would be scoped and designed thereafter.

Stage 1 works would include:

- Replacement of the under-slab drainage in the 2:1 sections of the spillway chute and filling of voids beneath the slabs
- Installation of corrosion resistant passive anchors in the 2:1 section of the spillway chute
- Installation of a 400mm reinforced concrete slab over the 2:1 section of the spillway chute
- Further engineering design, investigation and testing to inform Stage 2
- 3D physical hydraulic modelling

- Update Business Case to define Stage 2

Stage 2 would tentatively include works related to the 10:1 section, the dissipator, the siphon, potential anchoring of the spillway walls, and updating the comprehensive risk assessment.

Implementation

The February 2016 Business Case provided a cost estimate for the project development costs to date and the Stage 1 works. The total was $28.8M as a P90 cost estimate. The actual construction works were estimated at $10.25M. An addendum to the Business Case was made to account for updated design details on the anchors and potential effects from artesian flows not previously understood. The new anchors impacted the cost estimate by $4,100 per anchor for a total of $4.5M. Revised construction methodology to address the artesian flow conditions increased costs by $1.7M. The total revised Stage 1 P90 cost estimate was then $35.0M.

The construction contract was award to [redacted] in April 2016 in accordance with the procurement strategy.

A comprehensive risk assessment was completed as part of Stage 1 and it determined that Stage 2 would be required to reduce the risk below the ANCOLD limit of tolerability. The Business Case was updated in July 2016. The Stage 2 works were estimated at $60M and were scheduled for completion by November 2018. The total project budget was then $95M.

A detailed Project Management Plan was completed in February 2017, which encompassed Stages 1 & 2. From the monthly actual expenditure summary, it appeared Stage 1 construction was predominantly completed by December 2017, one year later than planned.

A Construction Management Plan was originally completed in February 2017. In December 2018, it was updated to reflect the proposed Stage 3. It described that during the design and associated modelling of the side walls in Stage 2, it was determined that the original design of anchoring and overlay slabs was no longer suitable or the most cost-efficient method. Instead, side wall training walls (gravity walls) would be constructed. This scope was defined as Stage 3. A December 2017 cost estimate was generated for Stage 3, revised three times, and finalised in September 2018. The final P90 estimate was $45M and construction was expected to be complete December 2019.

The historical expenditure for Stages 1, 2 and 3 from the project monthly cost reports are shown in Table 1. These are in nominal dollars.

Table 1 Actual Project Costs by Stage

Task	FY16	FY17	FY18	FY19[1]	Total
Stage 1 Planning & Design	$3.08M	$0.00M	-	-	$3.08M
Stage 1 Construction	$3.87M	$15.7M	$0.01M	-	$19.56M
Stage 2 Planning & Design	$0.87M	$1.69M	$1.98M	$0.49M	$5.03M
Stage 2 Construction	$0.04M	$6.10M	$29.8M	$5.94M	$41.9M
Total Stage 1 & 2	**$7.86M**	**$23.5M**	**$31.8M**	**$6.43M**	**$69.6M**
Stage 3 Planning & Design	-	-	$0.72M	$0.24M	$0.95M
Stage 3 Construction	-	-	$0.48M	$11.8M	$12.3M
Total Stage 3	**-**	**-**	**$1.20M**	**$12.0M**	**$13.2M**
TOTAL PROJECT	**$7.86M**	**$23.5M**	**$33.0M**	**$18.4M**	**$82.8M**

Notes:

1) FY19 costs are only up to February 2019.

The Stage 1 & 2 works as of February 2019 were $69.6M, less than the original $95M budget but work has not been completed. Based on the QCA RFI 58 cost forecast, it is projecting a final total cost of $122M.

The October 2018 Briefing Note identifies reasons for increased costs for Stage 2 including:

- Adverse ground conditions impacting anchor installation below 10 m depths that required added design, trials and construction methodology

- Poorer strength foundation material below the ogee crest requiring increases for post tensioned anchoring
- Mitigation of possible overtopping events during potential severe wet weather events, due to an extended construction duration

An increase to $103M for Stage 1 & 2 was approved in December 2017. As construction progressed on the ogee crest anchoring, it was determined that the original cost estimate of $2M was insufficient. The allowance was increased to $18M. The final approved budget was $120M. The briefing note states that the Stage 2 & 3 works are optimistically targeting late 2020 completion, weather permitting, although it was advised that mid 2022 may be more realistic and the extended construction timeline would further increase project costs.

The summary of the QCA RFI 58 project cost claims provided on 3 July 2019 are shown in Table 2. They are in nominal dollars.

Table 2 Fairbairn Dam Safety Improvement Annual Capital Expenditure

	Historical and Transitional		Price Path Period	Total	Budget
	FY16-19	FY20	FY21	-	
Stage 1 & 2					
Capital	$71.7M	$25.7M	$15.6M	$113M	
Contingency	$3.20M	$2.00M	$4.20M	$9.40M	
Total Stage 1 & 2	$74.9M	$27.7M	$19.8M	$122M	$120M
Stage 3					
Capital	$20.8M	$16.5M	-	$37.3M	
Contingency	$0.25M	$5.68M	$2.10M	$8.04M	
Total Stage 3	$21.0M	$22.2M	$2.10M	$45.3M	$45.0M
TOTAL PROJECT					
Annual Total	$95.9M	$49.9M	$21.9M	$168M	$165M
Totals by Period	$146M		$21.9M	$168M	

The RFI 58 cost claims for FY16-19 are $95.9M, which are $13.1M greater than those reported in the monthly cost reports; although the cost reports only go to February 2019. The Stage 1 & 2 cost claims are $5.2M for the remaining 4 months in FY19. The Stage 3 cost claims are $7.8M. Based on the 2019 Briefing Note, the higher costs are likely due to accelerating construction prior to the next wet season. The cost projected for FY20-21 appear consistent with the justifications presented in the 2019 Briefing Note. The total is $122M compared to the currently approved $120M budget. The additional $2M is assumed related to another potential construction delay due to wet weather, which has been highlighted in the briefing note.

The Stage 3 total cost claim is $45.3M, which is consistent with the September 2018 P90 cost estimate.

The total historical/transitional claim is $146M nominally ($147M in $FY19). The total price path period claim is $21.9M nominally ($21.0M in $FY19). No adjustments are proposed.

Findings

- Prudency: There is sufficient documentation on the risk assessments and regulatory requirements evidencing the need for this project. The project scope appears to have evolved over time. Some of this evolution was planned as part of the staged approach. Other parts were unplanned primarily as a result of unexpected sub-surface conditions. The risk assessments and detailed technical analysis carried out on each project element demonstrate the prudency of the project.
- Efficiency: While general good project governance has been adopted at a high level, it appears that efficiency may have suffered due to a lack of management of key project risks. It is evident

from a number of the project documents, namely the Design Report and the briefing note for shareholding ministers, that the project was beset by a number of challenges that affected scope, cost and schedule on the project. There appears to have been two key issues.

The first is associated with insufficient ground and condition assessments at the outset leading to additional risks being identified and subsequently managed as the project progressed in construction. The second relates to the consideration of pressure fluctuations that could occur under the side walls during significant flood events, which was not initially recognized and could lead to dam failure. Both of these issues appear to have been identified in the outset; in the case of the former identified as a low risk in the Business Case and in the latter, raised as an issue early on by the TRP, but not duly appreciated. They consequently caused issues in scope during the execution of the project. The scope could haven been more efficiently planned, but not avoided.

The process of fast-tracking construction concurrently with design due to the assessed urgency of the project appears to have placed pressure on the design team to make design decisions / assumptions to allow construction to progress, which with the benefit of hindsight did not manage the associated risk appropriately and were to the potential detriment of efficiency. The substantial changes to the scope, budget and schedule post-business case cast doubt on to the initial options selection as the final cost and schedule approach that of the original Option 3 New Spillway.

Altogether, the project has a high level of documentation quality. The variations in the project are well documented and although significant, they have been appropriately justified. The project cost claims are only $2-3M more than the final approved budget/cost estimate. The extra $2-3M may be needed for extended construction due to wet weather, as stated in the Shareholding Ministers Briefing Note. The overruns on the original budget are more likely related to original underestimating than poor project delivery cost efficiency.

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Appendix E

Assessment Forms for Historical Renewals

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Project Name	**Palmtree Creek Outlet Works**
Project Number	**07PIO05**
Project Description	**Replace Regulating Valve RV01 - Palmtree Creek Pipeline**
Asset Type	Regulating Valve
Year(s) to be Delivered	2007-2012?
Cost	$955,558

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	There is a lack of definition on the need for the project, i.e. the need for the replacement fo the release valve. The comment in the scope document is that the 'outlet works are to be modified to meet WH&S and operational requirements'. While the regulating valve is clearly part of the original functionality it would appear that there have been previous failures of the valve that have resulted in long periods of it being inoperable and it is not clear of the consequence of this inoperability and equally the risk of that continued operation / justification for the project. There is a statement in the original project brief about the temporary outlet being too high a risk, however this is not detailed.	Medium	Unable to assess	Project Scope Definition document Project Brief
	Were/are the works reasonably required to address a legal or compliance obliation with safety, environmental or other legislative requirements?	Insufficient information	Refer above	Medium	Unable to assess	Project Scope Definition document Project Brief
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above	Medium	Unable to assess	Project Scope Definition document Project Brief
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	Based on the documentation, it is not possible to determine whether the expenditure was appropriate in quantum or timing. There was no clear definition of the project objective / driver to be able to assess the opportunity for deferral. As mentioned above it appears the previous failures had previously resulted in long periods of inoperation without a defined / documented consequence.	Major	Unable to assess	Project Scope Definition document
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The proposed asset life of 80 years with 20 years for mechanical components. The original valve was supplied in 1996. The valve, any subsequent versions, have failed.	None	N/A	Project Scope Definition document
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The assessment indicates that the asset is inoperable. Failure inspections and vibration analysis provide root cause analysis.	None	N/A	Condition assessment screenshot Valve Failure Inspection 2008 July Vibration Analysis 2008 December

Comment on Prudency	Business case and prudency and efficiency documents should have reasonably been completed for a project of this nature and size. Provided documentation lacks the definition needed to determine whether the need / business case for this project, and whether it was prudent. Documentation does not clearly define the overarching need for the regulating valve or how they manage the seemingly long periods when it has failed previously. The project appears to have commenced shortly after the (second) failure of the valve in 2007, but the works were not executed until starting in 2011/12. Despite this, the project need is clear based on the condition and inoperable status of the valve coupled with the described risk of damage to the pipeline from waterhammer.
Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Detailed options assessment with 12 options plus one additional option. Options assessment was peer reviewed.	None		Project Brief Project Scope Definition document Options Analysis 2009 July Peer Review 2010 April Peer Review 2010 August
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Preferred option provides technical solution, full risk reduction and at least cost. Disadvantage is that it requires manual flow control.	None		Project Brief Project Scope Definition document Options Analysis 2009 July Peer Review 2010 April Peer Review 2010 August
	Were/are non-capex options considered (such as operational solutions)?	YES	Purely operational solution not possible. But preferred solution included a reduced CAPEX solution by requiring manual operational intervention.	None		Project Brief Project Scope Definition document Options Analysis 2009 July Peer Review 2010 April Peer Review 2010 August
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Minimal details available, however project scope identifies that the design will conform to Australian Standards	None		Project Brief Project Scope Definition document Options Analysis 2009 July Peer Review 2010 April Peer Review 2010 August
	Is the standard if works compatibile with existing and adjacent infrastructure or modern engineering equivalents?	YES	Based on the design analysis described, the modifications are consistent with the general existing infrastructure.	None		Project Brief Project Scope Definition document Options Analysis 2009 July Peer Review 2010 April Peer Review 2010 August
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A				

Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	The project scoping document budgeted $769,950 for the work. This included $489,000 for the supply and installation of the vales and piping. The quotes received totalled $348,956 from [redacted] and [redacted]. Add in $28,129 quotes by [redacted] for the waterhammer review. The actual expenditures was $394,918, which represents a difference of $17,823. This may be attributed to the cost of the [redacted] review, whose quote or cost was not provided. There is no information documenting contractor variations but based on the final contractor costs from the Total Actual Cost report, any variation would have been minor. The total overrun on the project are $185,607 and are attributed to non-direct Sunwater costs. The Sunwater labour had an overrun of $80,417 beyond the budget. The actuals also had a line item for Prior Year Expenses of $10,241 which should be excluded. The total non-direct costs appear to be 53% of the total project costs, which is considered high. No supporting documentation was included to justify project overruns; therefore it is expected that Sunwater would recoup some of the costs. The indirect and OH appears to be high too, but as this is managed through SAP, it is assumed as acceptable.	Medium	$90,658 should be deducted from the claim, which is a sum of the Sunwater labour overrun ($80,417) and the prior year expenses ($10,241).	Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present TRR Butterfly Guard Valve 2012 March TRR Pepperpot 2012 June TRR Pipe Mods 2012 June Tender Assessment 2010 March
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	NO	Competitive tendering was used for the butterfly valve, but only one bid was received. The pepperpot was later sole sourced to the same supplier [redacted]. Early engagement of other valve suppliers may have led to more interest in the project, and a more competitive price may have been received. That said, the [redacted] quote was in line with the budgeted amount. The pipe modifications were granted a procurement exemption to sole source the work to [redacted] based on urgency. The urgency in the project has not been proven, therefore the need for the exemption is uncertain. That said, the cost was $39,770 so a competitive bid would have a minor impact on total project costs.	Minor		Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present TRR Butterfly Guard Valve 2012 March TRR Pepperpot 2012 June TRR Pipe Mods 2012 June Tender Assessment 2010 March
If not, why?	See above				
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The indirect and OH costs were budgeted at 25% of the project costs. The final makeup was 34%. While they appear high, since they are managed through SAP, they are assumed reasonable.			Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	High level risk assessment included in project definition document. The absence of key documents though would suggest a lack of risk management rigour.			Scoping Document 2011 February
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	No cost escalation mentioned in any of the documentation.			
Were options considered in determining the least cost or preferred option?	YES	The least cost technically acceptable option was selected			Options Analysis 2009 July
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.			

	Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Whole of life costs were discussed in the Options Analysis such as the labour required for manual flow control, but the total whole of life costs were not fully quantified.			Options Analysis 2009 July
	Have any potential efficiency gains been identified?	NO	No efficiency gains were documented.			

Comment on Efficiency	In the best case, there is a whole suite of documents which describe the robust project management processes, detail contractor variations, and any changes to scope that affect both contractor and internal labour costs. These were omitted from the submitted documents. The valve replacement evidently had substantial technical challenges and resulted in a cost creep, primarily from Sunwater labour and indirect costs. Procurement processes were not effective to gain appropriate market conditions for material supply and installation. Expenses from previous years were also included which should not be part of this claim. For these reasons, the project was not considered efficiency and a minimum of $90,658 should be deducted.
Efficient	NO
Documentation Quality	Medium

Project Name	**Brightley Pstn 1 & 2**
Project Number	**11ETO06**
Project Description	**Replace Switchboards and Control Equipment**
Asset Type	Pump Station
Year(s) to be Delivered	
Cost	$968,264

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Brightly PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightly PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightly PS 1 & 2 were noted as being 30 years old and in poor condition. The typical serviceable life of electrical infrastructure is 15 years.	None		SunWater: Audit of Electrical Sites Memorandum: Eton Irrigation Area - Switchboard Upgrade Program
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The project is to replace the switchboards at Brightly PS 1 and 2 with switchboards complying with current Australian Standards. This project will also capture improvements in the control system by replacing the superseded relay control with Sunwater's standard specifications and current practices. it will also enhance operator safety and improve Sunwater's ability to monitor the PSs remotely.	None		Scoping Document 2013 March
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Brightly PS is essential infrastructure under the Eton Distribution Scheme. Sunwater have a regulatory responsibility under the Eton Distribution Scheme and would be at risk of not meeting the agreed level of service should the pump stations fail as a result of obsolete switchboards.	None		SunWater: Audit of Electrical Sites
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to replace the switchboards so that they comply with current Australian Standard requirements.	None		Scoping Document 2013 March Brightley PS 1 and 2 Switchboard Upgrade Specifications
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The standard serviceable life for switchboards and other electrical infrastructure is 15 years. The existing switchboards at Brightly PS 1 and 2 have exceeded this life expectancy by double and a therefore long overdue for replacement.	None		
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The switchboard audit clearly supports the replacement of the switchboards.	None		SunWater: Audit of Electrical Sites

Comment on Prudency	The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	There was no documentation of an options analysis completed for this project. However, the recommended action per the Sunwater: Audit of Electrical Sites suggests the only viable option was replacement of the switchboards. At a minimum, an options analysis should have been completed to consider the consequences of doing nothing, as well as the type of switchboard to be installed (Sunwater standard or otherwise).	Minor		
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	No options analysis completed.	Minor		
	Were/are non-capex options considered (such as operational solutions)?	NO	Refer above.	Minor		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement switchboards are in accordance with the requirements prescribed byAS/NZS 3439.1:2002 Low-voltage switchgear and controlgear assemblies, AS/NZS 3000:2007 Wiring Rules, AS/NZS 2067:2008 Substations and high voltage installations exceeding 1 kV a.c., and Queensland Electrical Safety Regulations 2002. The contractor specification included requirements for RPEQ certification.	None		Sunwater: Audit of Electrical Sites Spefications 2012 January
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The initial Eton Switchboard Upgrade Review 2009 estimated the switchboard replacement at $265,000 but did not include the associated equipment. The 2011 cost estimate appears to have more appropriately scoped the project and estimated $454,700 (exc. 10% cont and GST). Contractor quote was $703,516 plus $50,845 in appropriately justified variations. The final total project was completed for $1,037,850 with the contractor component at $756,868. The final non-direct costs were 27%, which is on the lower side for Sunwater projects. The total costs appear to be reasonable, and the initial budget cost estimates underestimated.	None		Prudency and Efficiency 11ETO06 Total Actual Costs Summary Tender Assessment
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A procurement process was undertaken in accordance with Sunwater's Significant Procurement Plan to price the costs of replacing the Brightly PS switchboards. Three suppliers were invited to tender, two quotes were received. [redacted] were awarded the contract,whose price was similar to the other bidder.	None		Tender Assessment Recommendation
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The final non-direct costs were 27%, which is on the lower side for Sunwater projects. Indirect costs cannot be specifically determined as they are lumped with overhead, but appear to be close to 10%, which is reasonable.	None		11ETO06 Total Actual Costs Summary

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	Unable to assess whether the appropriate processes were followed to manage risk and uncertainty based on the information provided. There was no evidence of project mangement planning. Better forward planning may have improved early scoping and prevented the large cost overruns recorded for this project.	Minor		
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	The works were delivered over three financial years, with early works pushed to later years. Effects of cost escalation are not documented but are likely negligible.	Minor		11ETO06 Total Actual Costs Summary
Were options considered in determining the least cost or preferred option?	NO	No options assessment.	Minor		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No alternatives considered.	Minor		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The project was initiated as the switchboards had reached the end of their economical life. In addition to meeting legislative requirements, replacing the switchboards provided many benefits including increased remote operational ability of the pump stations and access to current (lower cost) spare parts.	None		Project Scope Definition
Have any potential efficiency gains been identified?	NO				

Comment on Efficiency	This project lacked documentation in several key areas that would have justified the replacement works undertaken and the funds that were exhausted. The original budget was under-scoped and underestimated and was not an accurate representation of the final funds spent. Alternatives were not formally assessed. Overall, the quality of documentation is low and did not demonstrate appropriate project management processes were followed. That said, the contractor was competitively bid and matched market conditions. It comprised the majority of the project costs. Final non-direct costs (27%) were lower than typical Sunwater projects. Therefore, the final project costs appear to be efficient.
Efficient	YES
Documentation Quality	Low

Project Name	**Eden Bann Weir Fishway PLC and SCADA Upgrade**
Project Number	**12LFZ12**
Project Description	**Replacement of control equipment for fishlock**
Asset Type	Control
Year(s) to be Delivered	FY 2015
Cost	$139,241

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Serviceable life of the fish lock control system was nearing its end. Old parts were identified as obsolete and not supported by the manufacturer. The control system is integral to the operation of the fishway.	None		Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Obsolete parts relate to compliance obligation of operating the control system. This justifies the upgrade of the control system.	None		Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater will be in breach of The Waterway Barrier Works Development Approvals (Fish Habitat Management Operational Policy FHMOP 008) if the fishway is inoperable due to control system malfunction.	None		Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		Options Analysis
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 10-15 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		Options Analysis
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Records show that the PLC and SCADA computer were built and installed in 1999. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.	None		Options Analysis Scope of Works

Comment on Prudency	The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure to operate the fish lock would be a breach of Sunwater's regulatory requirements.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Internal and external control system models considered as options. A "do nothing option" was also considered.	None		Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on costs, it was more beneficial to replace the control system with Sunwater Standard PLC Hardware (Schneider).	None		Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A "do nothing option" was considered, however this was ruled out as this puts Sunwater at operational risk that may result in them being in breach of the regulatory requirement. Consequences of a breach include prosecution, penalties and a damaged reuptation. Running the fishlock manually was considered but dismissed due to prohibitive labour costs ($0.5M p.a.)	None		Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1999, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for Sunwater engineers nor PLC Programming Software licencing.	None		Options Analysis Scope of Works As Builts History Record
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		Options Analysis Scope of Works
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.		None		Options Analysis Scope of Works
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Lack of documentation breaking down project expenditure. Quote received from contractor is for $88,796 incl. GST. Total expenditure recorded as $139,241. Project closure report states asset cost is $88,796; therefore, it is assumed there were no contractor variations. The non-direct Sunwater cost would then be 36% of the total project cost, which is reasonable for this type of project. The budgeted figure of $146,208.40 is also reasonable, which is only 5% more than the actual cost.	None		Offer Recommendation Project Closure Report
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Based on the time schedule for completion of works, Sunwater applied for an expemption from competitive procurement process. [redacted] were invited to provide an offer.	None		Procurement Plan

If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No record of indirect costs or justification.	Medium		Offer Recommendation
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Thorough risk assessment undertaken in options analysis.	None		Options Analysis
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
Were options considered in determining the least cost or preferred option?	YES	Least cost option derived from options analysis.	None		Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Cheaper maintenance as parts are available on the market.	None		Options Analysis
Have any potential efficiency gains been identified?	YES	Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.	None		Options Analysis

Comment on Efficiency	As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed; however, the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Although the information provided was generally high quality, there was a lack of information regarding incurred project costs. That said, the overall cost generally aligns with the scope of works that is described, was under the original budget, appeared to have no contractor variations, and had low non-direct cost. For these reasons, the project cost can be considered efficient.
Efficient	YES
Documentation Quality	Medium

Project Name	**Tinaroo Dam Gallery Light Replacement**
Project Number	**12MDA57**
Project Description	**Replace lighting system at the Tinaroo Falls Dam Gallery**
Asset Type	Lighting
Year(s) to be Delivered	2015/16
Cost	$480,001

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	N/A		None		Renewals Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obliation with safety, environmental or other legislative requirements?	YES	Electrical system does not comply with current standards and is 60 years old. Asbestos in lights presents a health and environmental risk that needs to be addressed. Emergency lighting at risk of failure, presenting safety risk.	None		Renewals Detailed Options Analysis BW R&E Project Scoping and Delivery Plan
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	N/A		None		Renewals Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The asset is non-compliant and presents a risk that needs to be addressed in the immediate term.	None		Renewals Detailed Options Analysis
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information the assessment of life in the condition assessment appears consistent with industry standards.	None		Renewals Detailed Options Analysis BW R&E Project Scoping and Delivery Plan
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	Insufficient information	Pre project condition assessment was not provided, however, based on other project drivers the absense of it is not material to the project assessment.	None		

Comment on Prudency	The project is deemed prudent because it seems clear that the asset had reached the end of its life and posed a risk to the health and safety of the personnel entering the TFD gallery. The March 2015 detailed options assessment and the 2014 Facility Condition Assessment provide clear identification for the project and demonstration of prudent project development.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Clear options considered in options assessment including the do nothing option.	None		Renewals Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Evaluation of options is transparent and defensible.	None		Renewals Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	While there are no opex only options considered, an option was considered to defer capital through additional opex spend.	None		Renewals Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Based on the information provided, the project appears to conform with standards.	None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Is the standard if works compatibile with existing and adjacent infrastructure or modern engineering equivalents?	YES	Lighting system and power distribution replaced to current standards.	None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Scope has considered upgrades to led fittings in replacement of fluourescent tubes		None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Tendered works with demonstration of selection for value. The lower of the two tender submissions was selected to perform the contract to prove the efficiency. The original cost estimate by Sunwater was low due to the increased scope in the quantities of lightings in the tender. Estimation of internal hours appears reasonable.	None		Project closure report Updated scope of works Tender assessment report
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Pricing works through competitive tender suitable. Engineering documentation brief appears suitable and to required standards. The scoping document states the procurement strategy is to go out for 5 tenders at least, but there are only 2 tender submissions. There is no supporting doc for this tender has been sent to at least 5 tenders	None		Project closure report Updated scope of works Tender assessment report
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Build up of hours appears reasonable.	None		Cost estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	While the general PM processes have been followed there appears to be a large disparity between the planned and actual costs which is unexplained by the documentation. Part of the cost increase appear to be from the higher than estimated tender pricing for the installation works.	None	Likely no material change	Project closure report Updated scope of works Tender assessment report
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	NPVs have been used in options assessment although no information on what discount rates have been used.	None		Renewals Detailed Options Analysis
	Were options considered in determining the least cost or preferred option?	YES	MCA used appears appropriate	None		Renewals Detailed Options Analysis
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used appears appropriate	None		Renewals Detailed Options Analysis
	Did the project consider whole of life costs, including future maintenance and operating costs?	YES	To a limited extent. No material quantification / assessment of operating costs for the new lighting.	None		Renewals Detailed Options Analysis

	Have any potential efficiency gains been identified?	YES	Potential further opportunities for additional assessment on efficient lighting options	Minor	Not considered material to the overall project based on the inherent choice of efficient lighting.	CONTRACTOR SCOPE OF WORKS 15SW4605

Comment on Efficiency	The project was delayed (from the initial recommendation) and project expenses waere incurred over several years. It is not clear why these delays occurred. The original project cost estimated significantly underestimated the scope of work, particularly the total number of light fittings to meet Australian Standards. Both of the two contractors who quoted on the project had quotes significantly higher than estimated. The preferred contractor was almost $137,000 less than the other bidder, which emphasizes the importance of competitive tenders. The contractor executed the work without variations. The non-direct costs were 48% of the total project costs. While high, this is typical for Sunwater electrical projects. Overall, the project appears to have been delivered efficiently.
Efficient	YES
Documentation Quality	Medium

Project Name	**Tartrus Weir - Flood Damage Repair - Protection and Erosion Works Refurbishment**
Project Number	**12NMA08**
Project Description	**Refurbish the protection works downstream of the weir.**
Asset Type	Weir
Year(s) to be Delivered	2014
Cost	$251,213

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Rock protection associated with the weir was eroded and needed repair. Significant erosion of the left and right bank abutments was observed with evidence undermining of the weir. Reinstatement of the bank was required to ensure ongoing protection of the weir during flood events.	None		Email Tartrus Weir Flood Inspection Annual Inspection Report Request for Offer
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The asset is "not referrable under the Water Supply (Safety and Reliability) Act when assessed in accordance with the Queensland Guidelines for Failure Impact Assessment of Water Dams (DERM, 2010) due to the fact that impacts in the event of failure of the weir would be within the bed and banks and that population risk is less than 2. However, Sunwater has classified the weir as 'Major' in terms of importance of the asset within the Nogoa Supply Scheme and the complexity of components including outlet works." SunWater has a regulatory obligation under the Nogoa Supply Scheme. Safety inspections are required annually as maintenance of site safety is difficult. Evidence of unauthorised vehicle access was observed in the latest Annual Inspection Report. Rock protection was identified to reduce erosion of the river bed and scouring around weir structure. Tartrus weir mitigates flooding in area.	None		Annual Inspection Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Asset has major importance within Sunwater's Nogoa Supply Scheme and is part of the water management protocol, e.g. flood mitigation.	None		Annual Inspection Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Damages resulting from the 2011 flood present safety risks and evidence of undermining the weir. Timing of expenditure was appropriate based on seasonal wet weather and planned capital works in accordance with the annual and five yearly weir inspections.	None		Annual Inspection Report

	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information, the assessment of run-to-failure asset life in the condition assessment appears consistent with industry standards. A material variation was required as the volume of rock and concrete used during construction had to be increased. Additional materials and labour were necessary to achieve project outcomes.	None		Annual Inspection Report Prudency and Efficiency Document
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	After photos support proposed works. Damages repaired and no further erosion observed.	None		Before and After Photos As Builts

Comment on Prudency	The Tartrus Weir was damaged after floods in 2011. Based on the information provided, the weir is of major importance to Sunwater's water supply scheme. The refurbishment of rock protection was required to reinstate the pre-flood condition of the structure and prevent further damage from occurring. The document provided was sufficient in demonstration project prudency, as without the works Sunwater could face breaches in their regulatory obligation under the Nogoa Supply Scheme.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	Based on the information provided there was no options assessment. Although it is unlikely there were other suitable options to treat the damages recorded in the Annual Inspection Report, a do nothing option should still be considered. The remedial works could have been deferred, however the prudency of the project was suitably established to justify the treatment.	None		Annual Inspection Report
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Given that no options were investigated it is not possible to comment on whether the scope was the best method.	None	Unable to assess	Annual Inspection Report Scope Document
	Were/are non-capex options considered (such as operational solutions)?	NO	Not discussed in documentation provided. Refer above.	None	Unable to assess	
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Works appear to align with industry standard treatments for rock protection reinstatement. As built drawings which detail the rock protection repairs were provided.	None		Scope Document
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Treatment suitable to restore existing infrastructure.	None		Scope Document
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	More accurate estimation of rock/concrete volume to reduce material variations. Utilisation of existing contractor and sole source quarry increased efficiency.		None		Prudency and Efficiency Document
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Material costs were based on market conditions and variations were prices according to previous invoices for the same project.	None		Prudency and Efficiency Document
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Contractor was competitvely bid. Supply of rock to sole source quarry was justified due to locality of works and nearby quarry likely to reduce cost of materials and labour.	None		Procurement Plan Exemption
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Indirect costs were accounted for in the budget breakdown. The costs were reasonable. However, no breakdown of final expenditure was provided.	None		Prudency and Efficiency Document
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Low risk as detailed condition assessment undertaken to scope works. Design brief includes drawings of site with defined scope of works for quotation.	None		Annual Inspection Report Scope Document
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	Variations based on work completed to-date.	None		Prudency and Efficiency Document
	Were options considered in determining the least cost or preferred option?	YES	Alternative rock suppliers were considered although sole source was justified based on proximity to he weir thereby reducing costs for the project.	None		Procurement Plan Exemption
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above	None		Procurement Plan Exemption
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No discussion of whole of life costs.			

	Have any potential efficiency gains been identified?	YES	Utilisation of nearby quarry increased efficiency of rock supply delivery labour.	None		Procurement Plan Exemption Prudency and Efficiency Document

Comment on Efficiency	Sufficient documentation was provided to demonstrate consideration for project efficiency. The cost of the project was managed despite creep occurring due to additional rock required to repair scouring of the river bed. Funds were made available to cover cost creep from other projects. The estimated variation was based on costs incurred to date, outstanding invoices and expected internal costs. The additional work was carried out by the contractor who was established on site enabling it to be completed within the required timeframe and also making it more cost efficient. Documentation quality could be improved with consideration of alternative options and whole of life costs. The supply of rock was exempted from competitive tendering as per the procurement policy due to the distances of site from other quarries were much longer than Dingo mining, thus more costly. No record of final project expenditure breakdown was included so conclusions have been made based on a) contractor/supplier quotes and b) total project expenditure being less than original business case cost estimate. Note that the Historical Renewals spreadsheet summary provided by Sunwater lists $229,417 of costs on this project.
Efficient	YES
Documentation Quality	Low

Project Name	**Investigation and Works Required at Moolabah Weir**
Project Number	**12SGA24**
Project Description	**Dam Break & Upgrade (Phase 3)**
Asset Type	Weir
Year(s) to be Delivered	2012
Cost	$639,046

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The need for emergency works of the Moolabah Weir was evidenced in the condition assessment and a thorough justification of its repair was clear in the scoping documents and final report. The apron slabs of the weir had been lifted in various places, the clay embankment within the structure of the weir and left abutment was eroded, and several instances of advanced piping was observed resulting in loss of storage through the weir.	None		Condition Assessment Scoping Document Final Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Based on the information provided, the weir in its deteriorated condition did not meet compliance requirements.	None		Condition Assessment Final Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The weir is a regulating structure for releases from Beardmore Dam and forms a pumping pool for a number of upstream regulators. The observed failures of the weir present issues in SunWater's water management protocol. This was identified as a primary driver for the project.	None		Final Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The budget constrained the timing of the works. It was identified that project completion was required in FY13. Repairs were also required prior to the following wet season to prevent further damages.	None		Scoping Document
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information the assessment of life in the condition assessment appears consistent with industry standards.	None		Final Report Scoping Document
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Weir had failed due to piping of the embankment material.	None		Condition Assessment

Comment on Prudency	The prudency of this project is evidenced by the safety risks imposed by the reduced structural integrity of the weir after the record 2012 floods. Although emergency works were completed for part of the weir structure, the full storage of the structure was compromised. Three residents downstream of the weir were identified as housing a population at risk, driving the need for the full restoration of the weir.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	The remediation works were separated into stages and a final report detailed an options assessment for the complete restoration of the weir structure. Option 4 was identified as the preferred treatment, which involved extending previous repair works of the weir (shotcreting and dam break study).	None		Final Report
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The option chosen was the least cost.	None		Final Report
	Were/are non-capex options considered (such as operational solutions)?	YES	Decommissioning was assessed as an option, however this would not resolve the flood risk and would ultimately require works upstream at Beardmore Dam. Subsequently, this option was not recommended.	None		Final Report
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Based on the information provided, including detailed designs, the standard of work appears to conform with industry standards.	None		Final Report Scoping Document Design
	Is the standard if works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Options assessment considered decommissioning the weir, although this was not a feasible or recommended solution. Alternative weir constructions included sheet piling, although this was ruled out due to unsuitable embankment material.		None		Final Report
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	A budget overrun of $100,412 was recorded at project completion. Additional costs were attributed to plant hire, concrete cutting/pumping, steel, survey, overheads and miscellaneous items. While, inadequate scoping and errors in the budget estimate are the primary underlying reasons, some of the overrun may have been mitigated had Sunwater scope the project more accurately andput the works to competitive pricing based on a firm scope, rather than apply for an exemption. The urgency of the project was to annual budget availability, which is not considered apppropriate. Furthermore, the construction started in May leaving one month to complete. More appropriate planning and project management would have reduced the urgency and allowed more appropriate scoping and procurement. The overruns related to underestimated quantities are justified, but those related to hours or rates have been considered inefficient as a result of poor planning and procurement. It is recommended the overruns (beyond the budget plus 20% contingency) be absorbed by Sunwater. This includes the concrete cutting ($2,068) and the dam break analysis ($29,986). Another $8,045 of overrun was ommitted from the Budget Overrun Document.	Medium	$40,099	Budget Overrun Document

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	NO	Sunwater was approved for exemption from competitive pricing. Insufficient information provided to determine market conditions. While [redacted] is considered appropriate as a sole supplier, the other contracts should have been more properly scoped and competitively bid. Instead they were sole sourced with only hourly rates and no firm scope.	Medium	Captured in above amount	Budget Overrun Document
If not, why?	SunWater should engage in competitive purchasing process.				
Was/is the allowance for indirect costs reasonable for the scope of the project?	NO	Refer above			
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	Source data for original budget estimation was Project Manager for interim works (previous repair works at the weir). Estimations were not clearly justified.			
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Refer above			
Were options considered in determining the least cost or preferred option?	YES	Scoping works considered the cheapest treatment.	None		Scoping Document Final Report
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The final report investigated four options with a reasonable and justified solution with least cost outcome.	None		Final Report
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The options analysis considered securing the weir for the long term.	None		Final Report
Have any potential efficiency gains been identified?	NO	None identified			

Comment on Efficiency	There were several inefficiencies observed in this project. Original budget estimations were loosely based on Project Manager experience from previous repair works. There were also errors in the quantities and rates. Cost estimation for material supply and plant hire could have been improved if a competitive purchasing process was adopted. All but one supplier / contractor were sole sourced with no clear scope, so a clear representation of market conditions could not be determined. Poor scoping and budgeting combined with exemptions from the competitive purchasing process resulted in the budget being overrun by 19%. Some of the deviations from the original budget could have been prevented by following the standard procurement process. Therefore, budget overruns should partially be absorbed by Sunwater. Furthermore, the quality of verifications of the quantities in BoQ should be improved to prevent large variances in the actual cost. It is noticed that some of the similar services were awarded to different suppliers. Had service be packaged to a single supplier, Sunwater would have more negotiation power. Furthermore, internal costs for contractor management should decrease. The proposed adjustment of $32,054 is based on the overruns for the dam break analysis and concrete cutting beyond the budgeted amount and contingency. For these tasks, had appropriate scoping and site inspection occurred, the work would have been conducted more effectively. Other overruns due to incorrect quantities and uncontrollable site conditions have been appropriately documented and are accepted. Lastly, the total cost from the Budget Overrun document omitted $8,045 in project overrun. Without justification, this has been considered inefficient and added to the adjustment total. The total is $40,099.
Efficient	NO
Documentation Quality	Medium

Project Name	**Don Beattie PSTN**
Project Number	**13BIA48**
Project Description	**FD01 (2013) Flood Damage Repairs - Don Beattie PSTN**
Asset Type	Pump Station
Year(s) to be Delivered	FY16
Cost	$1,272,616

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Don Beattie Pump Station forms a crucial part of the Bundaberg Distribution Scheme. Multiple damages were reported as a result of the 2013 flooding of Burnett River. One of the most critical was scouring of the embankment, which previously provided support and protection to the rising main at Don Beattie PS. Without the embankment, vibration of the pipe and permanent supports have been reported. The vibration has caused some spalling of the supporting concrete. Other damages include loss of the PS's access road, site drainage, deposition of debris and silt into the pump intake structure, significant scouring around the intake structure, deposition of debris around the pump well base, damage to the septic tank installation, damage to stormwater pipe, damage to pump well sump pump and discharge pipework, damage to lightning protection system.	None		Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Sunwater have a responsibility to supply water under the Bundaberg Distribution Scheme. The damages reported as a result of the 2013 flood have directly affected Sunwater's ability to access, operate and maintain Don Beattie PS. As such, this puts Sunwater at risk of not providing the agreed level of service to its customers. There is also a safety risk associated with the existing condition of the site, should site personnel try to access it without remediation works.	None		Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	Could not determine from the information provided why works were delayed several years (from the peak flood event in 2013 to 2016).	Medium		
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	Insufficient information	Asset life information could not be assessed based on the information provided.	Medium		

	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Photo evidence was provided of Don Beattie PS which clearly demonstrate prudency of repair works. In 2013, two flood peaks were recorded with many of the repair works of January.	None		Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak Before Photos February 2013

Comment on Prudency	Don Beattie Pump Station forms a critical part of Bundaberg's Distribution Scheme. Its key structures include a pump well tower, rising main and offtake pipelines, and a surge tank tower. The pump station is a deep well construction, approximately 34 m deep. Access to the pump station is achieved via a bridge, although a lower road access track is available to inspect the pump well base and rising main. A summary of damages incurred to Don Beattie Pump Station were documented in several stages. The first flood peak was observed January 2013 and included the subsequent remediation works which were undertaken immediately prior to the 2nd flood peak which was recorded in April of 2013. Large quantities of earthfill berm were displaced from the wet well base, which exposed the rising main and concrete foundations of several structures including the pipe supports. The quality of documentation was medium and demonstrated project prudency.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were investigated as part of the scoping phase. These include: 1. Do nothing; 2. Replace 'like for like'; 3. Concrete encase the rising main pipe; 4. Denso wrap coating the rising main pipe then fill with free draining material and cap with concreted rockfill.	None		R&E Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Option 4 was recommended as this method of repair will ensure that the rising main is protected from future flood events.	None		R&E Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered; however, this was disregarded as the consequences of not proceeding were too great. Sunwater would be in breach of their regulatory responsibility to operate infrastructure and supply water under the Bundaberg Distribution Scheme.	None		R&E Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Several drawings of the repair works were provided (DWG 246589-1, DWG 246884-0, DWG 246886-0) . These appear conform to modern technical engineering standards. Design brief was written in accordance with Sunwater Specifications including General, Conventional Concrete, Concreted Rockfill, and Free Draining Backfill.	None		DWG 246589-1 DWG 246884-0 DWG 246886-0 SunWater Specifications: #1, 2, 3, 4
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Although mutliple budget revisions were provided, spanning from 2013 to 2016, the total project expenditure of $1,272,616 was not appropriately justified. In the document Budget Increase 2016 September, it appears approval was sought to increase the budget from $498,369 to $898,369 so that the preferred contractor can be engaged for a contract value of $793,430. The contractor completed the works only $3k above their quote; therefore the construction appears to have been completed efficiently. There doesn't appear to be any documentation for budgeting of the design, planning, and procurement phases of the project (years 2013-2016). While these project development costs appear high, the total non-direct costs comprise 32% of the total project costs which is in line with typical Sunwater project delivery.	None		Cost Estimates Budget Increase 2016 September

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	The Request for Offer (RFO) No. 16SW4810 - Construction of Don Beattie Pumpstation Rising Main and Bridge Pier Works was released on the Queensland Government QTender website 29 July 2016. Six offers were received and registered accordingly. Each offer was assessed in accordance with the Evaluation Plan which was developed and accepted by the Evaluation Committee (refer to HB Doc #1989386). The contract was awarded to [redacted] for a sum of $798,975.20 excl. GST.	None		Detailed Offer Evaluation Process
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Overall, the non-direct costs appear to be 32% of the whole project, which is reasonable. The indirect costs are assumed appropriate as they are managed through SAP.	None		13BIA48 Total Actual Costs Summary
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Damages were scoped at a high level in the Flood Inspection Report. Geotechnical consultants were engaged to assess the stability of the site's slopes and any observed geotechnical issues. Cathodic and lightning protection requirements were documented. The process for development of scope of works was thorough and in this regard managed risks due to scope creep. An Options Analysis was also undertaken to gauge the most appropriate repair for the damages observed.	None		Flood Inspection Report Geotechnical Inspection Report Memo on Cathodic & Lightning Protection
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	One instance of a budget increase was requested and attributed to the cost of engaging the preferred contractor for remediation works. The budget increased from $498,369 to $898,369. The construction phase occurred over a single year, but the start of construction was delayed multiple years without explanation. No evidence of cost planning or escalation was given.	Medium		Budget Increase 2016 September Cost Estimate 2013 - 2016 13BIA48 Total Actual Costs Summary
Were options considered in determining the least cost or preferred option?	YES	A high level cost estimate was completed for the four options assessed in the Options Analysis. The preferred option was chosen based on cost, risk and benefit.	None		Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Each option was assessed using a weighted MCA to determine the overall best option.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The preferred option addressed long-term risk of damages, which would have resulted in increased maintenance and repair costs. Increased capital expenditure would reduce ongoing costs of pipeline repairs.	None		
Have any potential efficiency gains been identified?	N/A				

Comment on Efficiency	Based on the documentation provided, there was clear consideration for the best means of repairing the damages at Don Beattie PS. The appropriate processes were followed in terms of defining project scope, consideration of capital and operational expenditure, options analysis and procurement of works. However, the original version and subsequent variations to the approved budget were not adequately recorded. No evidence for budgeting the plannning/design phase was made; therefore, overall project budget overrun could not be assessed. The construction phase in FY17, however, appeared to be efficient and the overall project non-direct costs were in line with typical Sunwater projects.
Efficient	YES
Documentation Quality	Medium

Project Name	**Eden Bann Weir**
Project Number	**13LFZ07**
Project Description	**Repair, maintain and de-silt the fishlock**
Asset Type	Fishlock
Year(s) to be Delivered	FY 13/14
Cost	$532,600

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Fishlock determined to be inoperable due to debris post-flood.	None		Project Scope Definition
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	Assumed regulatory requirement for fishlock to operate.	None		Project Scope Definition
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Although not documented, it is known from previous project 13DVA06 that operation of fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008.	None		N/A
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Timing justified based on meeting regulatory requirements.	None		Project Scope Definition
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the information provided, the proposed works align with industry standards for a fishlock.	None		Project Scope Definition
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Silt evident in fishlock, hindering its operability.	None		Before Photos

Comment on Prudency	The detailed project scope definition provides a reasonably clear identification of project scope; however there is no information around the statement of regulatory requirement for the fish lock's operation to demonstrate prudent project development. It is known from other projects that the fishway is a regulatory requirement, therefore it can be assumed prudent, but level of documentation is low.
Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No options analysis. Like for like repairs undertaken.	Minor	Unlikely to impact price	Flood Damage Inspection Report Project Scope Definition
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A				
	Were/are non-capex options considered (such as operational solutions)?	NO	None considered.	None		Flood Damage Inspection Report Project Scope Definition
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	Lack of information to determine if installed works confirm to industry standard; however project scope definition references appropriate Australian Standards.	Minor	Unlikely to impact price	
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Based on the design analysis described, the modifications are consistent with the general existing infrastructure; like for like repairs.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Costs incurred ($532,600) were less than the approved budget ($680,874).	None		Budget Estimate June / September
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Various pricing approaches were adopted for this project. Hydraulic works were sole sourced so some uncertainty of whether costs matched market levels, but efficiencies in design and installation were identified by using the original supplier. Mechanical services were tendered and cost was appropriate based on market conditions.	Minor	Potentially cheaper options available for hydraulic works	Procurement Plan Short Form Evaluations
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Sufficient contingency allowed for completion of works.	None		Budget Estimate June / September
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	Inadequate risk management processes identified. Extent of risk management is large contingency (50%).	Medium		
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
	Were options considered in determining the least cost or preferred option?	NO	No alternative options considered	Major	Potentially cheaper alternative options.	Procurement / Offer Documentation
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A				
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No discussion of whole of life costs.			
	Have any potential efficiency gains been identified?	YES	Sole sourcing contractor with knowledge of site and internal access to as-built drawings.	None		Procurement Plan

Comment on Efficiency	Documentation does not clearly demonstrate project efficiencies. Alternative options were not considered. Justifications for key criteria were omitted. Quality of documentation was low as multiple documents were missing, including the report of actual expenditure, and there were general inconsistencies in processes followed. That said, the project was delivered well under the allocated budget and cost estimate (even without contingency). Note that the Historical Renewals summary provided by Sunwater states $493,849 of costs on this project.
Efficient	YES
Documentation Quality	Low

Project Name	**Fairbairn Dam - Investigation of Spillway**
Project Number	**13NMA04**
Project Description	**Locate voids beneath the concrete spillway slab at Fairbairn Dam**
Asset Type	Dam
Year(s) to be Delivered	2013/14 FY
Cost	$731,843

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Initial observations of drummy concrete at a previously established repair site were investigated and later determined by Ground Penetrating Radar (GPR) to be voids. Multiple voids outside of the intitial investigation area were determined, particularly in the steep, lower portion of the spillway where coloured seepage was observed. The stability of the spillway apron may be compromised by seepage under the concrete slab. Traverse drains were previously installed to facilitate under-slab drainage and to assist in relieving pore pressure. The voids observed indicate these drains are not working as intended. Failure of the dam would prevent Sunwater from meeting agreed service levels.	None		Investigations and Change in Scope
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are required to determine solutions to repair and prevent dam failure.	None		Investigations and Change in Scope
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The Fairbairn Dam is major infrastructure in SunWater's water resource scheme. It is critical that it operates as intended to manage water levels. Definite signs of deterioration have been observed that need to be addressed to restore the structure to design condition.	None		Investigations and Change in Scope
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	A thorough investigation of the damages was undertaken prior to the initiation of design and construction works. A formal technical review process was completed and determined that spillway stability was potentially compromised as a result of the seepage observed. Once a suitable solution was identified, it was critical to commence works as soon as possible to prevent further damage and manage risk of catastrophic failure of the spillway. Construction was delayed from FY2015 due to insufficient time to safely conduct works prior to the wet season.	None		Investigations and Change in Scope

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Fairbairn Dam was originally constructed between 1969 and 1972 from mass reinforced concrete. The standard life expectancy for concrete is 50 years, so the structure is nearing its serviceable life. Considering the transverse drains underneath the slab were constructed from earthenware pipes, it is possible these have since failed due to age.	None		Investigations and Change in Scope
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Images of the voids were reported in the Fairbairn Dam Spillway Void Repair Report. This prompted further investigation of the voids, which later developed into project 13NMA04.	None		Fairbairn Dam Spillway Void Repair Report

Comment on Prudency	It is clear from the documentation provided that a suitable process was followed to develop and justify the project scope. The initial damage was observed during superficial repair works to the spillway apron, which later prompted further investigation under the concrete slabs. The investigation determined that there was significant seepage under the spillway resulting in a 1.8m x 1.5m x 0.8m void which was undermining the structure and presenting risk of failure. Multiple voids were subsequently located and so the extent of the damage gave rise to the project's prudency. Additional investigations were need collect information to allow options assessment and design.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	An options analysis was completed post initial investigations to determine the most effective solution. As part of the options development stage, a Technical Review Panel (TRP) was involved to provide comment. The TRP made an alternative recommendation to SunWater's proposed strategy, and recommended that a set of emergency works to be undertaken in an order of priority.	None		Investigations and Change in Scope
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Refer above.	None		Investigations and Change in Scope
	Were/are non-capex options considered (such as operational solutions)?	N/A	Given the scope development and advice from an external TRP, a non-capex option was not feasible for this project due to the risk of failure of the spillway structure.	None		Investigations and Change in Scope
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The design process aligned with standard industry practice. Initial scoping was determined by GPR, concrete core driling, CCTV and geotechnical data review. The treatment strategy involved external peer review and assessment of options by a TRP.	None		Investigations and Change in Scope
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Short term maintenance works including installation of drain outlet baffles, repair of blocked drains, joint sealing, anchor replacement and void filling is required to restore the structure to its design condition. The standard of works align with original design intent.	None		Investigations and Change in Scope
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The total project spend ($731,843) was less than the approved budget ($764,443), presenting a reduction of $32,600. The initial investigations costs to till end of April are $359,943 against a budget of $285,279, and due to further investigation required, an extra funding of $404,500 resulting in a total of $478,864, and the increase of scope for investigations is documented, however the overspend of $74,364 is not explained in provided documents	Medium	$74,364 is attributed to overspend as no supporting documents are available to show the cost breakdown.	Investigations and Change in Scope
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A competitive procurement process was undertaken for the GPR/CCTV works with Requests for Offers being sent to [redacted], [redacted] and [redacted].	None		Offer Recommendation
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Based on the funding breakdown, the allowance for indirect costs was reasonable to ensure project management and procurement processes could be followed. Sunwater's indirect cost breakdown in the cost estimates is reasonable.	None		Memorandum - Project Update and Request for Confirmation of Project Funding and Cost Estimates

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A condition and risk assessment matrix was completed.	None		Condition and risk assessment
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	Request for additional funding was completed in the memorandum by Sunwater.	None		Memorandum - Project Update and Request for Confirmation of Project Funding
Were options considered in determining the least cost or preferred option?	YES	Preferred option determined through assessment by TRP.	None		Investigations and Change in Scope
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		Investigations and Change in Scope
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The works were undertaken to mitigate potential future maintenance costs resulting from spillway failure.	None		Investigations and Change in Scope
Have any potential efficiency gains been identified?	YES	Sunwater utilised local contractors who worked on initial investigations and who is familiar with the site to complete restoration works, making it more cost efficient. The estimate was based on costs incurred to date and expected internal and contractor costs, which proved accurate as the total budget approved was sufficent to cover costs incurred.	None		Prudency and Efficiency Document Memorandum - Project Update and Request for Confirmation of Project Funding

Comment on Efficiency	Sunwater clearly followed standard PM processes to ensure the project scope was defined, suitable solutions were identified and the funding was mostly appropriate and effectively utilised except for the identified overspend of $74,364 in the preliminary investiation phase of the project (GPR/CCTV). The quality of documentation provided was medium, and there was generally clear consideration for project efficiencies throughout the project development phase to execution, however cost breakdown of the overspend was not provided.
Efficient	NO
Documentation Quality	Medium

Project Name	**Coolmunda Dam**
Project Number	**14MAB05**
Project Description	**Adjust the lengths of the wire ropes to keep floats within the guide range**
Asset Type	Dam
Year(s) to be Delivered	2014
Cost	$283,434

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	As part of the Coolmunda Dam Safety Inspection, it was observed that the counterweights, which operate the flood gates at the dam, were getting close to the end of their guide within the float well chamber. Coolmunda Dam operates in a very similar manner to Callide Dam. If the counterweight wheels are below the existing guides, there is a risk that in a flood event when the counterweight rises in the float chamber, it will catch on the guide and jam the gate. This incident previously occurred at Callide Dam, therefore increasing urgency for improved counterweight functionality.	None		Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The functionality of the dam gates at Coolmunda Dam could be compromised during a flood event, as was previously observed at Callide Dam.	None		Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The operation of the dam gate is critical to Sunwater's requirement to fulfil regulatory obligations as part of their water management protocol, particularly during flood events.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Works to improve the engagement between counterweights and guiderails should be completed prior to the following wet season to ensure the gates are functional during the next flood event. Urgency of the works is reinforced by the realisation of the project risk at Callide Dam, where the gates jammed for the same reason.	None		Detailed Options Analysis
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	It appears as though the problem with the wheels extending past the guides is not new, as previously reported in 2008. The issue is likely the result of steel rope creep.	None		Project Scope Definition
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The observations images taken by [redacted].	None		Before Photographs

Comment on Prudency	The disengagement of dam gate wheels from the guiderails had previously resulted in gate failure at Callide Dam. The risk of similar failure at Coolmunda Dam is likely, with the consequence during a flood event being catastrophic. Gate functionality during a flood is critical to ensure compliance with Sunwater's regulatory obligation to manage water resources. The prudency of this project is reinforced by the failures of Callide Dam in 2013.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Full options identification and analysis undertaken as part of scoping process. Cost-benefit and risk analysis completed to support assessment. Detailed options assessment provided in options analysis report.	None		Project Scope Definition Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on the MCA, the option selected provided the most benefit, least risk and least cost of the seven options considered.	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however it was determined to not be in Sunwater's best interest based on risk and precedent at Callide. Should SunWater proceed with doing nothing, and the risk was realised, Sunwater would be in the spotlight from the regulator for not acting on a known issue after a similar scenario occurred at one of their dams in the same year.	None		Project Scope Definition
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The re-engagement of the gate wheels with the guiderails is consistent with the structure's design requirements.	None		Detailed Options Analysis
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The treatment works aim to achieve the original design condition of the dam gates.	None		Detailed Options Analysis
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	The incurred cost was justified by the high costs of WH&S. The cost estimate is almost double the original cost estimate without a cost breakdown; although within the accuracy bound (+100%) of the options analysis stage.	Medium		Detailed Options Analysis Prudency and Efficiency Document
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	Unable to comment as an exemption from competitive offering process was granted in accordance with SunWater's Purchasing Policy and Guide, and the State Procurement Policy on the grounds that genuine urgency exists. The final expenditure claim exceeds the $180,000 value quoted in the Exemption document, but there is no information to show much of the final expenditure claim is attributed to the contractor.	Medium		Short Form Significant Procurement Plan
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	Additional costs were required to proceed with the safest option. There is no supporting document of costing indirect costs.	None		Prudency and Efficiency Document
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A risk analysis was completed as part of the scoping process and options analysis phases.	None		Detailed Options Analysis

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Quotation was received from a contactor in accordance with SunWater's Purchasing Policy and Guide.However there is no cost escalation methods mentioned in the supporting docs.	None		Prudency and Efficiency Document
Were options considered in determining the least cost or preferred option?	YES	A cost-benefit analysis was completed for the options identified. The preferred option was to put a second rope on the float and tie off to a beam.	None		Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA was thorough and supported the options assessment outcomes.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The project considered the long term operation of the dam gate and consequences of failure should repair works not proceed.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	The support system manufactured to undertake works has been retained by Sunwater and can be used again.	None		Prudency and Efficiency Document

Comment on Efficiency	An appropriate approach was adopted to assess the best outcome option for the refurbishment of the dam gate wheels and guiderails to ensure operability of the Coolmunda Dam in future flood events. The project scope and proposed methodology were well defined. Safe work methods was a non-negotiable given the large mass of the counterweights being repaired. The work was undertaken incident free, and Sunwater were able to retain the support system manufactured to complete the works. The successful outcomes of this project in terms of safety, cost and operation are a demonstration of project efficiency. The increase in cost estimate in the Prudency and Effciency document are not broken down and it is not clear how the final expenditure (twice the estimate from the options analysis) was allocated but some of it is assumed attributable to the contractor, as its original quote detailed 5 workin days whereas the final appears to have been 23 days. The cost estimate is almost double the original cost estimate but within the options analysis accuracy bound (+100%).
Efficient	YES
Documentation Quality	Low

Project Name	**Mareeba-Dimbulah Water Supply Scheme**
Project Number	**14MDA13**
Project Description	**Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2**
Asset Type	Control System
Year(s) to be Delivered	FY15/16
Cost	$876,952

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Mareeba-Dimbulah Water Supply Scheme (MDWSS) encompasses the towns of Atherton, Walkamin, Mareeba, Mutchilba and Dimbulah. It provides water for agricultural land and two hydro power stations: Tinaroo Dam and Barron Gorge. The Mareeba Distribution SCADA control system was installed in 1995 to provide automatic and remote control and monitoring of key water control locations in the scheme. The equipment is now 20 years old. The SCADA assets are responsible for regulating gateway control of the system. As the system is obsolete, it is necessary to upgrade to reflect modern technologies.	None		Scope of Work 2013
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment within the MDWSS is outdated and no longer compliant. SCADA allows less site work and minimizes environmental overflow.	None		Scope of Work 2013 R&E Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The control system forms part of the operational infrastructure used in the MDWSS. The proejct is needed to manage Sunwater losses within loss allocation.	None		Scope of Work 2013 R&E Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	An audit was undertaken of the control system in the MDWSS which support the proposed works.	None		Mareeba SCADA Site List (Doc #1592348)

Comment on Prudency	The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the MDWSS.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Five options were considered as part of a Detailed Options Analysis. These include: 1. Do nothing; 2. Remain with [redacted] system and refurbish, partially replace and recommission; 3. Replace all with [redacted]; 4. Replace all with [redacted] based and/or other systems; 5. Partial replace with [redacted] and/or other systems - operate with multiple systems.	None		Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Various options were considered from doing nothing to refurbishment or replacement of the existing system with the same supplier product or to change to a new product entirely. As there are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required. The detailed analysis of these options as above identifies that the best option is to continue with the [redacted] system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants. Therefore, the recommendations are: - Continue with [redacted] system and refurbish and replace; - Procure [redacted] products on a sole supplier basis.	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered; however, this was disregarded as the SCADA becomes less reliable and presents a WH&S risk as more operator intervention is required during work and after hours. Further, the risk of overflows would increase, there would be a higher NPV compared to other options, risk breaching operational requirements, and could result in poor customer relations resulting from flow fluctuations.	None		Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The [redacted] software replacement was awarded to [redacted]. As defined in audit documentation, the control systems must adhere to Australian and Sunwater standards. The project is still active and due for completion in FY18/19, therefore as builts not yet provided for assessment.	None		Mareeba Dimbulah SCADA Site Audit and Strategic Plan Offer Recommendation Report
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Existing structures were provided for consideration of refurbishment with new [redacted] control systems.	None		Request for Offer
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					

Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	The scoping and budgeting of the project was inconsistent, dynamic and poorly documented. The [redacted] component was sole sourced as they are the only supplier of their software/hardware. It appears they were under budget although this is assuming they completed their scope. There is no documentation to show that was done. That said, there is little recourse as they are the only supplier. Variations to the contract were well document (although slightly disorganised). The project non-direct costs were 45% of total, which is average for Sunwater electrical/controls projects which require greater Sunwater staff involvement. Overall it appears to be reasonable (assuming scope was completed).	Medium	Assuming scope was completed. If so, no adjustment is necessary.	Scope of work, Procurement plan 2015
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Because it was a refurb of an existing system, no alternative competitive tenderer was sought. [redacted] is the sole supplier of the hardware and software.	None		Procurement plan
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	NO	The original cost estimates underestimated the necessary indirect costs. A P&E document stated that tendering became more complex as they tried to reduce the [redacted] quote to below the allocated budget.	None		Cost estimate and actual cost summary
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	The scoping phase was well-documented with the entire control system part of MDWSS assessed in accordance with Australian and Sunwater standards. That said, as the scope changed, the project management documentation was not updated.	Minor		Scope of Work 2013
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	The project ran across multiple financial years, and part of the [redacted] scope was deferred to future years. There is no information to assess the impact of cost escalation from this.	Minor		
Were options considered in determining the least cost or preferred option?	YES	The preferred option was assessed against a MCA with the following criteria: time, cost, risk, and benefit.			Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA used is appropriate.			
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Replacement of the obsolete infrastructure was determined to be preferred over refurbishment as this would provide cost benefits for future operations and maintenance of the infrastructure.			Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Options study #1664805 considered other known options and this chosen option was the lowest NPV and risk to achieve required outcomes. Post offer evaluation the costs of all option in this options study will increase proportionally for all options and will not change the relativity of the options.	None		Prudenccy and Efficiency 2016 Novemeber

Comment on Efficiency	Based on the information provided, the appropriate processes for effective project management were originally adhered to but were not carried forward through the project. Five options were assessed against an appropriate MCA framework. The preferred option presented the best cost with most benefit as Sunwater was familiar with the [redacted] System currently in place. The project scope, direct costs, and non-direct costs were all underestimated, and the project scope was reduced as a result. Considering [redacted] is a sole supplier, the revised scope appears to be cost efficient; however, this is assuming the contracted scope was completed. Final non-direct costs (45%) are within the average range for Sunwater electrical/controls projects.
Efficient	YES
Documentation Quality	Medium

Project Name	**Copper Sulphate Research Project**
Project Number	**14MDA33**
Project Description	**Study Copper Sulphate Research Project - West Barron Main Channel**
Asset Type	Channel
Year(s) to be Delivered	FY15/16
Cost	$436,166

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Sunwater uses Copper Sulphate to control filamentous algae in irrigation supply channels and in January 2003 applied to the Australian Pesticides and Veterinarian Medicines Authority (APVMA) to register copper sulphate as an algacide for use in irrigation channels to maintain reliability of water supply. The activity is currently carried out under an existing Off-Label Permit previously issued by the Queensland Government for which responsibility was later transferred to APVMA. The permit is set to expire in 2013 and so the works are required to determine forward management strategies for algae control in Sunwater's open and closed water supply channels.	None		Briefing Note for DPI&F
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	There is a legal and compliance obligation in association with the APVMA to obtain permits so that Copper Sulphate can be used for control of algae in Sunwater's Mareeba Dimbulah Irrigation Water Supply Scheme.	None		Permit to Allow Research Use of an Agvet Chemical Product
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The permit forms an integral part of Sunwater's management of water quality and supply. Without copper sulphate dosing, algae growth would be uncontrolled and may negatively impact Sunwater's ability to supply water for irrigation purposes to its customers under the Mareeba Dimulah Water Supply Scheme.	None		Approvals For Use of Copper Sulphate in Sunwater Schemes. Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The works under this project form part of a rolling program which began in 2006. This project was initiated in response to the Copper Sulphate Research Permit expiry.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	This is a compliance based issue, not asset age/condition			
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	Refer above.			

Comment on Prudency	This project was initiated to ensure that Sunwater could continue the control of algae in open and closed channels as part of their irrigation supply under the Mareeba Dimbulah Water Supply Scheme. In renewing the copper sulphate research permit, Sunwater have engaged a specialist consultant and peer reviewer to provide advice on a recommended strategy for progressing its application to APVMA. The consultant assisted Sunwater's environmental team in developing a sound understanding of thetechnical details of the scheme, monitoring data as well as the proposed treatment approach.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A	An options analysis was not completed as this is a research project. The works undertaken were necessary to proceed with the permit approvals process. As part of the research, other alternatives are being investigated.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.			
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Sunwater engaged a specialist consultant to develop strategies for algae control and the regulatory submission as part of this project. The outcome of the research may lead to the development a Code of Practice.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission Approvals For Use of Copper Sulphate in SunWater Schemes
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	There is no supporting documentations for the project scope or budget. While there is lack of information on the procurement processes for consultants and laboratory serices, the majority of the project was self-performed, therefore efficiencies from procurement improvements would be minor. There are references to the a budget as of FY15 and final expenditure was below this budget. While there is no supporting evidence to show scope was completed, it has been assumed that it has been completed and as a result the project costs are deemed reasonable.	None		Actual cost summary Prudency and Efficiency 2015 Project Request Change 2019
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	From the actual cost file, the major costs are Sunwater's internal labour and indirect costs, the only purchase order from all the supporting docs is for[redacted] and the purchase order $90k is not in the actual cost summary, and the procurement process is unknown.	Minor		Actual cost summary
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	N/A	The project was self-performed research project and an assessment of indirect costs is not applicable.	None		
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The early engagement of the regulator served as appropriate diligence to mitigate risks and gain regulatory support for the project and permitting process.	None		
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	The only impact of cost escalation was to do with laboratory services, which had a 5% escalation per year. The materiality of these costs is small, and appropriateness of escalation is minor.	None		

Were options considered in determining the least cost or preferred option?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Have any potential efficiency gains been identified?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		

Comment on Efficiency	The technical components of this project are in accordance with industry standards. In the document Approvals For Use of Copper Sulphate in Sunwater Schemes, Sunwater demonstrated project efficiency in their arrangements with APVMA and other federal agencies early on in the permit application process. In advance of their meeting, Sunwater prepared and sent a report outlining its proposed approach in order to identify any immediate concerns or suggestions of the federal agencies. The strategy for progressing Sunwater's application for APVMA approval for the use of copper sulphate is structured around its proposed use within closed systems (considered likely to be relatively straightforward) and open systems (likely to be more complex). The current trial is required to be continued to support full application of copper sulphate in the Mareeba System. There is a low quality of documentation for project scope, budget, and cost expenditure. As this project is predominantly self-performed by Sunwater and through regulator interaction, it appears to be executed to an appropriate standard. There is no information available to justify scope was compelteted and project cost efficiency, but the final budget appears to have been $455,000 and actual costs were $436,167 therefore, it is assumed as efficient.
Efficient	YES
Documentation Quality	Low

Project Name	**Callide Creek Flood Review**
Project Number	**15CVA16**
Project Description	**Review of Dam Operation as Callide Dam**
Asset Type	Dam
Year(s) to be Delivered	FY15 nd FY16
Cost	$1,545,858 (Stage 1 and 2)

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project was initiated by the Queensland Government through the Inspector-General Emergency Management (IGEM) Review process following the flood impacts from Tropical Cyclone Marcia. The performance of Callide Dam and SunWater's operations during this event was also assessed. The outcome of the Government's Review Report was thirteen recommendations for implementation by the various agencies responsible (including Sunwater), as released by the Government on 4 June 2015.	None		2015 Callide Creek Flood Review Volume 1: Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The review was instigated as a commitment by the Premier and Minister for the Arts, the Honourable Annastacia Palaszczcuk MP, to those affected by the flooding; to discover what role, if any, the Callide Dam played in the event.	None		2015 Callide Creek Flood Review Volume 1: Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The review was necessary as part of the disaster management strategy to reflect on past flooding events and to improve response processes in the future.	None		2015 Callide Creek Flood Review Volume 1: Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Expenditure was staged. Stage 1 deliverables related to the preparation of Sunwater submissions, and responding to the IGEM Review and requests for information. Stage 2 deliverable involved implementing relevant recommendations 2 to 13 from IGEM.	None		2015 Callide Creek Flood Review Volume 1: Report
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Asset life was not assessed as part of this project.			
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	In terms of the consequences of major flooding to the community, the devastation supports the review of the existing disaster management strategy and subsequent implementation of the IGEM Review recommendations.	None		2015 Callide Creek Flood Review Volume 1: Report

Comment on Prudency	Given the extent of the devastation as a result of the flood impacts caused by Tropical Cyclone Marcia, the significant loss of property and risk to livelihood, the Queensland Government initiated a review process of the disaster management strategy. Several recommendations were made, including actions to be completed with SunWater and various other agencies in the review. The review report was comprehensive and clearly demonstrates the value of the investigation and the benefits it may present to the community preparedness for future flood events.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A	Works aligned with the recommendations of the IGEM Review.			
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.			
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The role of the Inspector-General Emergency Management was first established is 2013 following a review of police and community safety. The IGEM role was formalised as a statutory position in 2014. The functions of the IGEM and the Office of the IGEM are prescribed in the Disaster Management Act 2003.	None		2015 Callide Creek Flood Review Volume 1: Report https://www.igem.qld.gov.au/Pages/default.aspx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	No changes to infrastructure as part of this project.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	The costs incurred by Sunwater were required to implement the recommendations from the IGEM Review. The actual phase1 and phase 2 project cost of $1,545,858 exceeded the budget amount of $1,410,000 by $135,858.	Minor	Overspend of $135,858 that is not explained	Project Cost Plan
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Flood studies were completed by external consultants as a joint study on behalf of DEWS and Sunwater. The project was initiated in response to the IGEM Review. Only documentation to support that the contract for the Project Director role was executed and procured via competitive tendering method. The hydraullic modelling and legal services do not have any supporting documents for procurement method.	None		IGEM Callide Valley Flood Review Recommendation State Update - June 2017. Request for Offers
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Indirect project costs were used to fund project and stakeholder meetings, travel and media. These appear to be justified to meet the required delivery of joint flood studies and improved disaster management strategies involving multiple stakeholders. However the supporting document only has the sum of the indirect cost, but no details of the cost estimate breakup.	None		Project Cost Plan
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	N/A	Project development strictly in accordance with IGEM Review recommendations. Little to no risk of project identified.			
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	No cost escalation evident.			
	Were options considered in determining the least cost or preferred option?	N/A	Option analysis not part of project; improvements in accordance with IGEM recommendations.			
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	Refer above.			

Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Refer above.			
Have any potential efficiency gains been identified?	YES	As stated in the Prudency and Efficiency document, these works are mandatory requirements in accordance with the IGEM review outcomes and to ensure optimum public safety with respect to flood warnings, public education, dam operation, gauging network improvements (flood monitoring and predictive capability) and consideration of potential flood mitigation options and benefits.	None		Prudency and Efficiency Document

Comment on Efficiency	Sunwater implemented the recommendations of the Queensland Government initiated IGEM Review, as it was a mandatory requirement. Adequate project management documentation for the type of work under these two stages was provided. This included status updates of the project progress. Budget breakdowns for each stoage were provided; however there is no document to justify the actual cost increase of $135,858.00 over budget. It is noted that the contingency amount was not approved due to budget constraints, but the cost overrun would still have exceeded the contingency had it been approved. It appears the overage is due to two of the contractors ([redacted] and [redacted]) but primarily due to Sunwater staff for Project and Stakeholder Management.
Efficient	NO
Documentation Quality	Medium

Project Name	**Moura Offstream Storage (MOSS)**
Project Number	**15DAW01**
Project Description	**Upgrade PLC and SCADA System - MOSS Pump Station**
Asset Type	Storage
Year(s) to be Delivered	2016/17 FY
Cost	$260,693

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The existing PLC and SCADA control system at MOSS is operating past its designated life expectancy. The PLC controllers and RTU modules are obsolete and no longer supported by equipment manufacturers. Replacement parts will no longer be easily obtainable from the market when components fail. Therefore, the control system equipment should be upgraded to reflect modern technologies.	None		Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment at MOSS is outdated and consequentially no longer compliant.	None		Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	MOSS is part of the Dawson Valley Supply Scheme, which is owned and operated by Sunwater. Failure of the control system will result in Sunwater being unable to fulfil their regulatory requirement to manage water resources at MOSS. Sunwater also have a commerical interest as the scheme supplies over 15,000 ha of irrigated land, as well as several towns and mines along the Dawson River. The scheme has 153 customers utilising 260 offtakes. The works are required to comply with the Fitzroy Basin ROP (2006) and Dawson Valley Water Supply Scheme ROL, Standard Supply Contract, Asset Management Policy, WH&S Requirement and ROP environmental requirements driven by concerns including ecological sustainability and operational continuity.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		Detailed Options Analysis

	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		Detailed Options Analysis
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Records show that the PLC and SCADA computer were built and installed in 1999. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.	None		Detailed Options Analysis

Comment on Prudency	The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Dawson Valley Supply Scheme.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Three options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively, while Option 3 was the do nothing option.	None		Detailed Options Analysis.
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on costs, it was more beneficial to replace the control system with Sunwater Standard PLC Hardware (Schneider).	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. SunWater would also fail to meet public safety if the aged system failed during a flood or another emergency.	None		Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1999, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for SunWater engineers nor PLC Programming Software licencing.	None		Detailed Options Analysis
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above. The preferred option is like-for-like replacement.	None		Detailed Options Analysis
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.		None		Detailed Options Analysis

Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Multiple variations to the original project scope were cited (including approved and not approved). The variation register HB1994281 was referred to, however not provided as part of the supporting documents. The unapproved variations were documented as a new air conditioner in the control room to prolong asset life, and the installation of a power meter to determing the cause of recurring faults (this was noted as should have been included in the original scope of works). The cost estimate is revised several times and it is unclear why the initial cost estmate of $150,612 had increased to $277,995 as a sum of the initial cost estimate of $150,612 and the project planning costs from FY15 and FY16 toalling $127,385. A further increase ($16,644) was required citing additional works to be completed resulting in a final cost estimate of $294,639. The contractor variations appear well justified and documented. The total construction phase was within the accuracy bounds of the estimate from the Options Analysis.	Minor		Prudency and Efficiency Document
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A competitive procurement process was completed and quotes received from three contractors. The contractor with the lowest (best) cost-effectiveness ratio was awarded the works.	None		Memorandum - Approval to increase expenditure under contract number 15SW4571
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	25% contingency was allowed as part of the project budget.	None		Cost to Complete Spreadsheet
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Detailed risk assessment was completed as part of the options analysis phase. Project risk was effectively reduced by having a thorough process for defining scope of works.	None		Detailed Options Analysis
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Escalation is not considered as stated in the option study.			
Were options considered in determining the least cost or preferred option?	YES	Least cost option derived from options analysis.	None		Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Cheaper maintenance as parts are available on the market.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.	None		Detailed Options Analysis

Comment on Efficiency	As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. The cost estimates are revised several times but contractor variations appear well justified. The final contruction phase costs (FY17 and FY18) are within the accuracy bounds of the cost estimate from the options analysis. The FY15 and FY16 project development costs are 48% of the total project costs and may be high, but overall the project has shown good cost efficiency.
Efficient	YES
Documentation Quality	Medium

Project Name	**Teemburra Dam**
Project Number	**15PIO06**
Project Description	**Upgrade of Control System at Teemburra Dam**
Asset Type	Control System
Year(s) to be Delivered	2015
Cost	$472,207

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The control system in question operates the release of water from Teemburra Dam, the Tannalo offtake, the Palmtree Outlet and the fishlock at Dumbelton Weir. As the system is obsolete, it is necessary to upgrade to reflect modern technologies, and prevent a failure of the control system affecting the ability to meet agreed service levels.	None		Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment at Teemburra Dam is outdated and no longer compliant.	None		Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The Teemburra control system forms part of the operational infrastructure used in the Pioneer Valley resource operations plan (ROP). If the system fails, Sunwater would be in breach of contractual obligations and this would have a negative impact on stakeholder relations. Sunwater also provides water to several customers downstream as part of their Standard Suppy Contract in the Pioneer River Water Supply Scheme. Other requirements include Asset Management Policy, WH&S Requirement, and Environmental Requirement.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		Detailed Options Analysis
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		Detailed Options Analysis

	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Records show that the PLC and SCADA computer were built and installed in 1997. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.	None		Detailed Options Analysis Design Specifications

Comment on Prudency	The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively. These options do not include the replacement of the RTUs and repeater stations' equipment, and adopts a replace-when-required approach. Option 3 is similar to Option 2, replacing like-for-like with Schneider equipment, however it included replacement of the entire system. Option 4 was the do nothing option.	None		Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on cost and risk, it was more beneficial to replace the entire control system with SunWater Standard PLC Hardware (Schneider), Option 3.	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. Sunwater would also fail to meet public safety if the aged system failed during a flood or another emergency.	None		Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Sunwater's standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1997, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for SunWater engineers nor PLC Programming Software licencing.	None		Detailed Options Analysis
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above. The preferred option in like-for-like replacement.	None		Detailed Options Analysis
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.		None		Detailed Options Analysis

Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The option study is done prior to the work for identifying the lowest cost option of capital cost and O & M cost in future years. Also competitive tendering procurment strategy is used to select the best value for money contract. This demonstrates efficiency.	None		Detailed Options Analysis
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A significant procurement plan was completed for this project. Four offers were received for this invitation, with all offers similar and within $10k of one another. The quotes provided appear to consistent with the prevailing markets.	None		Offer Recommendation
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Multiple variations (refer to HB# 1874294) to the original project scope were cited. An increase of $69k was documented for additional contractor costs, while Sunwater had an additional $84k to the original budget estimate. Project Management accounted for $30k, while other costs and resources (such as procurement, travel, etc) was $80k. These additional costs were broken down and provided in the revised cost estimate.	None		Prudency and Efficiency Document Memorandum - Approval to Increase Purchase Order No. 5700086219
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A competitive procurement process was completed and quotes received from four contractors. The contractor with the lowest (best) cost-effectiveness ratio was awarded the works.	None		Offer Recommendation
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	There is a discounted rate of 7.49% applied to compare the NPV's of different options. 20 year Australia bond yield rate is 2-3%, Clarification should be sought to Sunwater on picking up a much higher discounted rates, which would have an impact on the NPV of different options, which would result the choice of option.	Minor		Detailed Options Analysis
Were options considered in determining the least cost or preferred option?	YES	Least cost option derived from options analysis.	None		Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Cheaper maintenance as parts are available on the market.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.	None		Detailed Options Analysis

Comment on Efficiency	As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Further, the best operational outcome and lowest risk of system failure could be achieved by replacing the entire control system. The information provided was high quality, and variations to the original budget estimate could be accounted for and justified. Based on the information provided, suitable processes were followed to demonstrate project efficiency.
Efficient	YES
Documentation Quality	High

Project Name	**Boondooma Legal Insurance**
Project Number	**16BYR07**
Project Description	**Boondooma Dam Spillway Repairs Project Insurance Claim**
Asset Type	N/A
Year(s) to be Delivered	N/A
Cost	$591,181

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	This project was created to capture legal costs associated with the Boondooma Dam Spillway Repairs Project Insurance Claim. There was no project documentation associated with this project.	None		
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The insurance claim and any dispute must be made within 6 years of the insurance claim or the flood event.	None		
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A				
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A				

Comment on Prudency	The legal costs associated with the insurance claim have not been considered appropriate as a capital project. It is noted that the insurance claim is not yet resolved. The November 2018 Price Review Submission states that the insurance proceeds have not been added to the modelling, but the flood damage costs have. It is recommended that the costs be rejected until insurance claim is settled, as the revenue from the insurance claim will offset the costs, potentially including the legal fees. Furthermore, as is referenced in clause 3.21 of the Australian Law Reform Commission publication 'Costs Shifting - Who Pays for Litigation (ALRC Report 75)', it is common for courts to order the defendant (i.e. insurer) to pay the plaintiff's (i.e., Sunwater) costs pursuant to the costs indemnity rule. For this reason, all or part of the $591,181 legal costs may be payable by the insurance company.
Prudent	NO
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A				
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A				
	Were/are non-capex options considered (such as operational solutions)?	N/A				
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A				
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A				
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	N/A				
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A				
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	N/A				
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	N/A				
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
	Were options considered in determining the least cost or preferred option?	N/A				
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A				
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A				
	Have any potential efficiency gains been identified?	N/A				

Comment on Efficiency	Efficiency assessment is not applicable to this project. Refer to Prudency section for comments.
Efficient	Insufficient information
Documentation Quality	

Prudent	YES
Documentation Quality	Medium

projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Project Description	**Refurbishment Outlet Works Gate**
Asset Type	Weir
Year(s) to be Delivered	2016
Cost	$25,903

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Cunnamulla township receives water supply from the storage at Alan Tannock Weir. Leaks estimated to be 1ML/day were identified by Paroo Shire Council at the outlet works of the weir. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.	None		Prudency and Efficiency Document Briefing Note
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The weir gate is non-compliant as it is leaking, resulting in significant water loss and risk to the long term water security of Cunnamulla.	None		Briefing Note
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.	None		Briefing Note
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works were required in accordance with the corrective order.	None		Briefing Note
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	At the time of the repairs, the asset was 25 years old. Mechanical parts typically have a serviceable life up to 20 years, so the gate was likely due for replacement.	None		Condition and Risk Assessment
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Before photos clearly show active water leak from the weir outlet works. A special meeting held between SunWater and Paroo Shire Council noted that readings from the Alan Tannock Weir indicate approximately 7.69 ML/day storage loss is occurring through the valve, seepage and evaporation.	None		Cunnamulla Water Advisory Special Meeting Before Photos

Comment on Prudency	The leaks observed at the Alan Tannock Weir pose a serious threat to the water security of the Cunnamulla township. It is evident, based on the information provided, that this project is prudent to the continuation of the town's secure water supply. Without repair works, SunWater will be in breach of their regulatory obligation to provide a consistent water supply under the Cunnamulla Weir Supply Scheme. Given the urgency of the project, some processes were not adhered to and documentation such as the Project Plan, Design Brief, Scope of Works, and Budget Estimate were not submitted. The overall quality of documents could be improved.

Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	Emergency works were required to repair the leak at Alan Tannock Weir. Initially, the proposed treatment was seal repair of the existing gate; however, undocumented modifications resulted in this being unfeasible. The following action was replacement of the gate entirely. No formal options analysis process was undertaken and the processes for corrective action were reactive.	Minor	Unlikely to impact cost if other options were considered due to urgency of repairs required	Briefing Note
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.			
	Were/are non-capex options considered (such as operational solutions)?	NO	A non-capex solution, such as a do nothing option, was not feasible as not proceeding with corrective works would put Sunwater in breach of their regulatory obligation under the Cunnamulla Weir Supply Scheme.	None		Briefing Note
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	As builts provided.	None		As Builts
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Repair of gate was like-for-like.	None		As Builts
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The incurred costs were attributed to immediate temporary repairs for the weir gate. Based on the attemped reseal, new gate fitting and sandbagging recorded as part of the works, the cost appears to be reasonable. However the remedial work is considered as double handling, as a temporary gate was installed, but it leaked again. Would appropriate design and factory tests have been done at the first place, the rework may not have been required	None		Revised Prudency and Efficiency Document
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	It appears [redacted] was used to supply and isntall the gate, but no details on the procurement process were provided.	Medium	Unable to assess	
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No record of indirect costs to be assessed.	Medium	Unable to assess	

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	The risk assessment provided is not sufficient to detail and confirm safe work methods were implemented during repair works. It was noted in the documents provided that there was concern the Sunwater staff, the contractors on site and members of the public (with ready access to the site) may have been at risk if the isolation had failed. Sunwater could face considerable legal liability if death or serious injury would have occurred. The Prudency & Efficiency document states that designs and any asset modifications must have RPEQ sign-off to ensure safety. There is no documentation showing RPEQ participation and the As-Built drawing does not show RPEQ sign-off.	Major	Unable to assess	Condition and Risk Asssessment Briefing Notes Prudency and Efficiency Documentation As-Built
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	A budget estimate was not provided for this project. No record of cost escalation.	Minor	Unable to assess	
Were options considered in determining the least cost or preferred option?	NO	No options analysis completed.	Minor		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	Refer above.			
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	Scope of works was for temporary repairs to be completed. Whole of life costs, future maintenance and operating costs would be considered in a subsequent project.	Medium	Unable to assess	Briefing Notes Prudency and Efficiency Documentation
Have any potential efficiency gains been identified?	N/A				

Comment on Efficiency	Appropriate processes for project management, scoping of works, budget estimation, procurement, and general record-keeping were not followed, resulting in inefficient project execution. There was insufficient information to properly justify the project expenditure and conclude whether the treatment was appropriate for the repairs required. Despite the documentation issues and given the claim amount of $25,903 is less than the project closure report expenditure amount of $30,737, the scope of work and costs can be considered appropriate.
Efficient	YES
Documentation Quality	Low

Project Name	**Mary River Barrage**
Project Number	**16MVA01**
Project Description	**Reinstate Downstream Rock Protection**
Asset Type	Barrage
Year(s) to be Delivered	2016
Cost	$386,652 (later revised to $973,938 to include FY19)

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Mary River Barrage forms a tidal barrier between sea water and fresh river water. It consists of a reinforced concrete crest structure supported on compacted sand between an upstream and downstream row of sheet piling. There are rockfill zones upsteam and downstream of the steel piling which provided support for the piling and scour protection. Displacement of the rock protection presents a risk to the asset. Loss of the downstream row of sheet piling and support for the crest could lead to crest failure and consequently an uncontrolled release and loss of the storage.	None		Scope of Works IAC Presentation 2016 June
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Protection of downstream row of sheet piling by zone IIIB is essential to retain the integrity of the structure.	None		IAC Presentation 2016 June
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater has a regulatory obligation to manage water in accordance with the Lower Mary Supply Scheme.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Works should be completed prior to upcoming wet season to prevent further damage or scouring of rock protection.	None		Scope of Works
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Construction of the barrage was completed in 1981. Historical damage of the rock protection indicate that displacement is probably after significant flood events. Previous damages were recorded in 1998-2000 and 2015.	None		IAC Presentation 2016 June
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Pictures taken of the barrage after the 2015 flood clearly show the displacement of rock from the sheet piles at Mary River Barrage. Assessments of the barrage are completed after flood events, which is appropriate for the structure and damages historically observed.	None		Detailed Options Analysis Construction Report

Comment on Prudency	The barrage is critical infrastructure in Sunwater's Lower Mary Supply Scheme. Given the role of the rock protection in supporting the sheet piling, it is evident that the repairs are prudent to the water security of the scheme. The appropriate PM processes were clearly followed to ensure the scope of works was defined and justified by the most recent condition assessment of the barrage. The documentation provided was of high quality and effectively demonstrates project prudency.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Several options were identified and assessed as part of the scoping process. Option 1 was do nothing, while Option 2 and 2a were to replace with 600mm and 800mm rock respectively. Option 3 was to use concreted rockill to EL 0.0. Option 4 was replace rock with concrete slab, and Option 5 was replace rock with tetra blocks or similar.	None		IAC Presentation 2016 June Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on the assessment of the options identified, the preferred option is justified as being the best means of achieving the desired outcomes given the scope of works.	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however it was disregarded as not proceeding with repair work would put Sunwater at unacceptable risk of not being able to continue to meet its service level standard. Loss of the downstream row of sheetpiling and support for the crest due to displaced rock protection could lead to crest failure and consequently an uncontrolled release and loss of the storage.	None		Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The Specification from Contract of Works includes drawings with appropriate specifications. A contruction report was completed detailing the processes undertaken during the construction phase. As built drawings were provided of the repairs.	None		Specification from Contract of Works Construction Report As Builts
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The rock protection was reinstated as per the original design, with consideration for rock size to ensure the protection remains in place.	None		Detailed Options Analysis
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The incurred costs for the project were within the original budget estimate for the project scope. The increases of scope and budget are well documented in the Prudency and Efficiency doc.	None		Cost Estimate & Prudency and Efficiency
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Sunwater followed the appropriate procurement processes for this project, with a competitive approach adopted. Six offers were received, which were documented and assessed in Offer Recommendation Report for RFO16SW4863. The offers received are a representation of consistency with market conditions.	None		Offer Recommendation for RFO16SW4863
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The cost estimate detailed the indirect costs proposed for the project, which are reasonable given the scope.			Cost Estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A safety, quality and environmental project management plan was completed as part of the approach for managing risk at project inception.	None		Project Management Plan

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
Were options considered in determining the least cost or preferred option?	YES	A detailed options analysis report was completed. Based on assessment against multiple criteria, the preferred option was determined to be Option 3.	None		Details Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Consideration of likelihood for future repairs was made and influenced the recommended option; althought the whole of life costs were not specifically quantified.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	NO				

Comment on Efficiency	It is clear from the high quality documentation provided that the appropriate PM processes were followed to ensure the project's success when assessed against the metrics of this review. There was a clear understanding of the issue at hand and thoughtful consideration for the best treatment. A detailed options assessment was undertaken, which identified seven options. A MCA approach was adopted and the most beneficial treatment in terms of cost, risk, outcome, and timing was recommended. As a result of the processes in place, the scope of works was well defined, and the project budget was adhered to despite variations due to inclement weather. Competitive tendering procurement processes were followed to ensure the costs were consistent with prevailing market conditions and selected as best value for money. Construction works were followed by a Construction Report and Certification of Practical Completion. Sunwater closed out the project with the relevant documentation. Overall, the rock protection at Mary River Barrage was successfully reinstated with the appropriate processes which in turn demonstrated project efficiency.
Efficient	YES
Documentation Quality	High

Project Name	**Peter Faust Dam**
Project Number	**16PRO03**
Project Description	**Investigation of the Spillway at Peter Faust Dam**
Asset Type	Spillway
Year(s) to be Delivered	2017/18 FY
Cost	$607,160

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Peter Faust Dam provides regulated releases for downstream irrigation and urban usage from the Proserpine River and through the Kelsey Creek Pipeline and provides a degree of flood mitigation. Damages observed at the spillway and right training wall may worsen without intervention and ultimately lead to failure of the structure.	None		Options Analysis (Options Study HB#1694772)
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are required to maintain compliance with Sunwater's Asset Management Policy, WH&S Requirement, and Dam Safety. Peter Faust Dam is classified as an Extreme Hazard Dam in accordance with Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD 2000b) and QLD Guidelines on Acceptable Flood Capacity for Warer Dams (DEWS 2013).	None		Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater have a regulatory obligation under the Proserpine Supply Scheme, Resource Operating Plan (ROP), and Organisation Reputation.	None		Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Further investigation of the spillway was required to determine the most appropriate corrective action. The timing of the expenditure was appropriate with works to be completed prior to the following wet season to prevent further damage from occuring.	None		Business Case
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	Peter Faust Dam was constructed over a two year period, completed in 1990. Given the serviceable life of concrete is typically 50 years, it can be concluded that the asset life is not consistent with standard run-to-failure life expectancy. However, the damages observed to the concrete components of the spillway chute may be a combination of spills over the dam and seepage issues resulting from blocked weep holes which have caused voids under the concrete structure.	None		

	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The most recent inspection report and accompanying photos support the damages outlined. The timing for inspections is appropriate for the structure, with annual inspections completed for the dam in addition to five yearly safety inspections.	None		Five Yearly Comprehensive Dam Inspection Report
Comment on Prudency		It is evident, based on the Inspection Report, Options Analysis and Business Case, that further investigations are required to determine the extent of damage at Peter Faust Dam and subsequently the most appropriate treatment. There was clear demonstration of prudency given the high quality, detailed information provided.				
Prudent		YES				
Documentation Quality		High				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	One alternative option was scoped, do nothing. Although some rejected options were briefly described.	None		Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	With consideration of timing, cost, benefits and risk, the preferred option was determined to be Option 1, which was to proceed with the repair of potential voids under "drummy" spillway slab, path Spillway Chute Flood and Right Training Wall cracks and reinstate the existing spillway drainage system.	None		Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however disregarded as the consequences of not proceeding would have resulted in greater costs in the future as well as significantly increased risk to safety and water resource management.	None		Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	No changes to the original design were made. All testing on site was in accordance with the relevant industry standards.	None		Five Yearly Comprehensive Dam Inspection Report Anchor Load Test Core Hole Investigation
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	There were several variations to the original project budget, although no changes to the project scope. Additional effort was required to finish the project. The project report dated 2016 indicates that the project scope was not completed due to insufficient funds and the fact that the concrete spillway floor was greater than anticipated. Subsequent works in 2018 were completed once more funds became available. The project completion report indicates that there were no voids, due to the thickness of concrete and relatively intact concrete cores obtained.	None		Project Report 2016 Project Completion Report 2018
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	An exemption for specialist services were applied for a small part of the project in 2016. For the larger components, a competitive procurement process was adopted in both phases of the project (2016 and 2018). In 2016, offers were sought from [redacted]. In 2018, three companies ([redacted]) submitted quotes.	None		Offer Recommendation Procurement Recommendation Tender Evaluation
	If not, why?					

Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	All indirect costs were documented in the budget estimate and prudency and efficiency documentation. Based on the information provided, the allowance appears to be reasonable given the project scope and regional location of the site.	None		Prudency and Efficiency (2016/2018) Budget Estimate
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A condition and risk assessment was completed during the scoping phase of the project. An issues and risk analysis was also detailed in the business case.	None		Business Case Condition Assessment Risk Assessment
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	Procurement processes followed for cost estimation of additional works.	None		Cost Estimate 2018 Contractor Scope of Works 2018
Were options considered in determining the least cost or preferred option?	YES	A detailed options analysis was completed, with the preferred option recommended.	None		Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA used was appropriate. The weighting of each criteria was suitable for the project scope, importance, and risks.	None		Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The project was initiated to mitigate future maintenance efforts and costs.	None		Options Analysis Business Case
Have any potential efficiency gains been identified?	NO	No significant efficiency gains were identified for this project.	None		Prudency and Efficiency

Comment on Efficiency	There were several unplanned material changes to the scope and budget throughout the first phase of the project. Larger than expected concrete thickness and the drainage pipe could not be located in the first attempt. The allocated funds were exhausted and the project scope was not completed, and instead proposed to delay the scope completion as part of a future project. The second phase was competitively bid in 2018 and the scope completed. It is clear that because the appropriate PM processes were in place, these changes were effectively managed and the project was successfully completed. The relevant approvals were provided in accordance with Sunwater's delegations (via SAP workflow / digital signature). The overall project expenditure was below the final combined budgets. The high quality documentation provided was adequate in demonstrating project efficiency.
Efficient	YES
Documentation Quality	High

Project Name	**Eungella Dam - Plug Outlet Conduit Permanently**
Project Number	**17BBR04**
Project Description	**Condition assessment of main conduit, guard valve and associated pipeworks.**
Asset Type	Dam
Year(s) to be Delivered	
Cost	FY16-18: $408,257 FY19: $672,553

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The main outlet conduit forms an integral part of the Eungella Dam's operation. Sunwater's inability to maintain it warrant works to restore the conduit to its intended design. Further, leaks through the stop lods which seal the inlet tower were identified as a risk to the dam in the long term.	None		Business Case
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	In its current state, the Eungella Dam outlet conduit does not comply with dam safety schedule requirements, as Sunwater are unable to inspect the conduit, guard valves and associated fittings.	None		Business Case
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	There is no reference to regulatory obligations in the business case.	Minor		Business Case
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	The stoplog leakage prevents safe inspection (and repair if needed) of the outlet conduit and associated equipment, which is required to comply with dam safety schedule requirements. Reference to the regulatory requirement and the timing/frequency for inspection was not provided in the business case. It is assumed as urgent.	Minor		Business Case
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	The dam was constructed in 1968 and is 49 years old. The assessed asset life in accordance with the risk assessment is 80 years; therefore the asset appears to have experienced premature failure. That said, hydromechanical assets may have a shorter life but this doesn't appear to be defined in the documentation.	Minor		Business Case Risk and Condition Assessment
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The 2000,2004,2010 all noted small leakge through the stoplogs. The 2014 annual inspection identified that the stoplog leakage exceeded the dewater pump flow capacity of 55 L/s. This shows an increasing leakage and thus deteriorating condition. The 2017 dive investigation conluded the downstream side of the stoplogs had gaps 2mm-20mm and 1.2-1.5m deep silt deposits in the inlet tower base. The condition assessment supports the proposed works.	None		Business Case

Comment on Prudency	Based on the information provided, Sunwater would be in breach of their dam safety requirements due to the unsafe access for inspection and repair of the outlet conduit, guard valves and associated fittings. Failure of the outlet conduit would lead to the inability to supply water. Sunwater are required under the Bowen Broken Supply Scheme to provide water supply from the Eungella Dam to customers. There is reasonable justification for the scope of works described under this project. The overall quality of documentation provided is medium.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Five options were identified and assessed as part of the scoping process. These options include placing mass concrete upstream; installing upstream formwork, reinforcement and concrete; installing upstream stop logs, installing upstream metal baulk, and doing nothing.	None		Business Case
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on the assessment of the options identified, the preferred option is justified as being the best means of achieving the desired outcomes given the scope of works.	None		Business Case
	Were/are non-capex options considered (such as operational solutions)?	YES	A doing nothing option is considered, but it does not address the long term issue to the asset	None		Business Case
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	NO	A Practical Completion Certificate is provided, but no construction report was provided. No after Diving report is included	None		Practical Completion Certificate, Diving report
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Design and construction of the works shall be in accordance with the latest revision of applicable Australian Standards, Statutory Codes and Regulations. Where no Australian Standard exists, work shall conform to the most current International Standards.	None		General Specification
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	The cost estimate breakdown for the proposed works in the design and construction phase appear to be reasonable. The business case stated that a total of $295,273 had been spent on the planning phase across FY17 and FY18 and that remaining $558,060 is required for the design and construction phase, which included a large conteingency of 50%. A Practical Completion Certificate states the project was completed in October 2018. The historical CAPEX claim of $408,257 and the FY19 CAPEX claim of $672,553 combine for a total project cost of $1,080,810, which is $227,477 above the budget. The large contingency in the budget, plus a lack of documentation, leads to a conclusion this overrun is not efficient.	Major	$227,477 in FY19	Cost estimate Business Case Practical Completion Certificate
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	There has been an exemption from competitive tendering for [redacted] to provide third party technical review. There appears to be a competitive bid for the inspection/options development/design component, but only one tender received. There is no tender evaluation/recommendation or full bid info of succesful bidder. For the construction phase, there appears to be an intent to conduct a competitive tender.	Minor		Exemption from Competitive Procurement Business Case
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	10% contingency is reasonable for this type of project and the proejct development phase. A 50% contingency is proposed for the design and construction phase.	None		Cost estimate Business Case

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Risk and Assessment summary is provided, although no details have been given	None		Risk, Condition Assessment
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
Were options considered in determining the least cost or preferred option?	YES	Option study identified the costs for different options, option 1 $558,059 being the lowest cost option was selected for proceeding.	None		Business Case
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Business Case
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Operating costs are considered in the business case for different options, however, the operating costs are nil for all the options	None		Business Case
Have any potential efficiency gains been identified?	NO				

Comment on Efficiency	It is identified as an efficient project (pending design and construction phase documentation). The documentation quality for the project development phase is high. Business case and detailed cost estimate have been done, and the costs are reasonable for this project. Since there is no evidence provided for the procurement of the design and construction phase, or any breakdown of project actual expenditure, the documentation quality is deemed low. This also has a significant impact on the project cost efficiency. A practical completion certificate states October 2018 project completion. It has been assumed that the project cost claim of $408,257 includes the design and part of the construction phase up to end of FY18. The FY19 CAPEX claim is $672,553. The combined CAPEX claim would be $1,080,810, which is $227,477 above the budget set in March 2018. Considering this budget had ample contingency built in, coupled with lack of documentation and justification for budget overruns, an adjustment of $227,477 is recommended for the FY19 year. The FY16-18 component has been assumed reasonable.
Efficient	NO
Documentation Quality	Low

Project Name	**Giru Weir Outlet Works**
Project Number	**17BRI31**
Project Description	**Install STG II Functional Outlet Works - Giru Weir**
Asset Type	Weir
Year(s) to be Delivered	FY16/17
Cost	$766,806

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with Section 88 Part (3) of the Burdekin ROP. The proposed works consist of a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.	None		BW R&E Project Scoping and Delivery Plan
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Yes, maintaining streamflow is needed to maintian the river and estuary health as required under the Burdekin ROP.	None		
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The 2009 Burdekin Basin Resource Operations Plan (Burdekin ROP) and Water Resource Plan (WRP) considered a number of environmental flow objectives (EFO's) and water allocation supply objectives (WASO's) for the Haughton River. In relation to Giru Weir, Section 88 Part (3) of the ROP sets out the following stream flow conditions to meet these objectives: 'The resource operations licence holder (Sunwater) must ensure that there is a minimum stream flow at Node 2 (Giru Weir) equal to the culumative daily flow recorded at the flow monitoring Node C (Mt Piccanniny 119005A) and the flow monitoring Node F (Major Creek 119006A), up to 40 ML/day.' The works are required to meet the ROP requirements.	None		BW R&E Project Scoping and Delivery Plan
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to bring Giru Weir to compliance with the Burdekin ROP.	None		BW R&E Project Scoping and Delivery Plan

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The gates had been in service for 40 years. Asset life for high risk outlet works is 50 years, but the asset had failed according to the condition inspection.	None		BW R&E Project Scoping and Delivery Plan
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Observations of Giru Weir in its present arrangement is not compliant with the Burdekin ROP.	None		BW R&E Project Scoping and Delivery Plan

Comment on Prudency	Changes to Giru Weir are necessary to meet the pass flow requirements under the Burdekin ROP. Inability to rectify this puts Sunwater at risk of persecution for breaching their regulatory requirements. As such, these works are considered to be prudent and immediate works are justified.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were considered as part of the project scoping phase. These include: 1. Design and install weir bypass pipeline and meter (manually operated) 2. Design and install weir bypass pipeline and meter (remotely operated) 3. Design and install on-weir pipeline and meter (manually operated) 4. Design and install on-weir pipeline and meter (remotely operated)	None		High Level Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	As described in the Detailed Options Analysis, four basis options have been considered to meet the pass flow conditions in the Burdekin ROP. All are gravity pipeline arrangements, either manually operated (Options 1 and 3) or with remote actuation (Options 2 and 4). After considering the functional requirements, risk profiles and WoL costs, Option 1 provides the most appropriate arrangement and is the recommended option for further consideration for detail design and construction.	None		High Level Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing and a temporary pump arrangement option have been rejected due to unacceptable WHS risks and the inability to properly meet the ROP requirements.	None		High Level Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard of works are in accordance with Sunwater technical specifications and Australian Standards. The specs provided include Concrete, Protection Works, Sheet Pile Driving, Corrosion Protection, Fabrication, Steel Works and Pipeline Installation. A detailed design report was issued at construction completion. As built drawings were provided of the works.	None		Concrete Specs Protection Work Specs Sheet Pile Driving Specs Corrosion Protection Specs Fabrication Specs Steel Work Specs Pipeline Installation Specs Detailed Design Report As Built Drawings
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The standard of works appear to be compatible with current industry standards.	None		Detailed Design Report
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	The cost to complete the project is over the initial budget. The non-direct costs are 16% and low compared to other Sunwater civil projets. The overruns appear to be due to contractor and material costs. Contractor/material costs exceeded their quotes by $144,917 without appropriate justifications for increases.	Major	$144,917	Briefing note Prudency and Efficiency Document Total Actual Costs
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	The construction appears to have been competitively tendered, but there are no supporting docs to show the cost of FB was least cost and competitive. Long lead item materials were sole sourced to companies with in-stock material to improve delivery times.	Medium		Exemption and procurement process
	If not, why?					

Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The final non-direct costs were 18% of the total project, which is low compared to other Sunwater civil projects.	None		Option study, actual cost
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The appropriate processes were in place to effectively scope the works required to meet the Burdekin ROP. The project was undertaken in stages, including an Options Study, Detailed Design Phase, and Installation/Commissioning. Much of the risk was managed in the project scoping phase. The Detailed Design Report has a comprehensive HSE design risk review.	None		Scoping Document Project Management Plan Detailed Design Report
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	The project was predominantly delivered in a single financial year. No cost escalation impacts.	None		
Were options considered in determining the least cost or preferred option?	YES	The preferred option was assessed using a weighted MCA framework. The key criteria included timing, cost, benefit, and risk. Option 1 was scored most favourably against this criteria.	None		High Level Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA framework was an appropriate method for determining the preferred option. The criteria and weightings applied were suitable for the project scope.	None		High Level Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The options analysis considered operating expenses and a whole of life approach.	None		High Level Options Analysis
Have any potential efficiency gains been identified?	NO	No other efficiency gains identified.	None		

Comment on Efficiency	To meet the requirements under the Burdekin ROP, the appropriate project management processes were in place to enable efficient project delivery. Several options were assessed against a MCA as part of a High Level Options Analysis. The preferred option was progressed to detailed design and construction, with all works completed in accordance with Sunwater technical specifications and current industry standards. The detailed design report captured all aspects of the construction works, with as built drawings provided at project completion. The contractor and materials costs appear to have incurred overruns beyond their original quotes. Lack of appropriate justifications for the overruns have led to the conclusion that an adjustment of $144,917 is warranted.
Efficient	NO
Documentation Quality	Medium

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Appendix F

Assessment Forms for Transitional and Forward Renewals

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Project Name	**Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.**
Project Number	**13NMA02 - Maintenance Key_0000076370**
Project Description	**Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.**
Asset Type	Dam
Year(s) to be Delivered	2023
Cost	FY21-24: $486,960

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Instability of the slope below the right bank lookout has been noted during an inspection undertaken in 2009 and subsequent intermittent slope failures have been recorded. Slope failures typically occurred as discrete rock falls on to the access track to the intake tower with the rocks being of sufficient size to damage the Armco guardrails. The most recent failure resulted in damage to a guard rail and Bureau of Meteorology monitoring equipment located close to the toe of the slope beyond the existing guardrail. During previous inspections, voids were identified and could be traced into the slope for in excess of a metre. An internal project (13NMA02) was initiated to investigate the Rock Face Stability which included Survey, Geotechnical Mapping, Drilling and Testing to facilitate the assessment of the stability of the rock slope below the lookout. This part of the project focuses on the last phase of the rock stability work on the rock face on the right abutment adjacent to the Weemah inlet tower. The rockfall risks present a safety to both staff and the public, and reduce the ability to operate the dam, increasing the risk to provide agreed service levels.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx Memorandum: Inspection of slope above the intake tower access road and Selma Road, Fairbairn Dam
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are required to minimise risk of rockfall which presents a safety risk to staff and the public.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Memorandum: Inspection of slope above the intake tower access road and Selma Road, Fairbairn Dam

Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified to minimise risk of rockfall. The works have already been postponed from FY17 out to FY23.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	Insufficient information	Fairbairn Dam was constructed in 1972. It is not clear if the rock was instated at the same time the dam was constructed, or if it has been repaired previously.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The most recent Annual Inspection Report for Fairbairn Dam was completed on 28-29 July 2014. The assets inspected include the Reservoir, Main Dam, Saddle Dam 1, Saddle Dam 2, Saddle Dam 3, Saddle Dam 4, Saddle Dam 5, Saddle Dam 6, Spillway, and Outlet Works. The condition of the dam at these locations varies from good to poor. The status of recommendations from past inspections record multiple repair works required within the financial year.	None		Annual Inspection Report 2014

Comment on Prudency	Rock instability of the right abutment adjacent to the Weemah inlet tower poses a safety risk. Given that a series of rockfalls have been recorded at this location, immediate works are justified to minimise the risk of further rockfalls. There is sufficient evidence in the documentation provided to consider this project as prudent.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	No alternatives were formerly identified, although some documents allude to an options assessment. A do-nothing option should still be considered as a non-capex consideration.	Medium	Unknown	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	Medium		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	An IFC drawing was provided for the repair works to right bank lookout rock face stabilisation, however there were no associated tehcnical specifications or guidance documents. As such, it is difficult to assess technical quality of work.	Minor		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	Minor		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	There is no defined project scope or finalized cost estimate to make an informed assessment. Based on the IFC drawing cut volumes, the Option 2b cost estimate could be scaled up. This estimate is within the range of the proposed FY23 CAPEX claim. Assuming no work was completed in FY17-FY22, the costs can be considered reasonable.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions. There is also no documentation of planned procurement approach. Rates used in the cost estimate appear to be reasonable.	Minor		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Several cost estimates were provided for the project. Estimate 2b appears to be the most comparable of the four estimates provided to the proposed budget. The typical % range for indirect costs was provided and appears to be reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Cost Estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	Insufficient information	Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.	Medium	Unknown	

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.	Medium	Unknown	
Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.	Minor		
Have any potential efficiency gains been identified?	Insufficient information	None identified	None		

Comment on Efficiency	For the proposed rock stabilisation works, there is insufficient information provided to comment on project efficiency. No alternatives were formerly identified. The cost estimates do not match the Issued for Construction drawings. There were no technical documents provided including procurement details despite it being understood that the project is in its final stages and was supposed to be delivered in FY17. Assuming all works have been delayed to FY23 and scaling the Option 2b cost estimate for higher excavation/reprofiling quantities, the CAPEX claim would appear to be reasonable.
Efficient	YES
Documentation Quality	Low

Project Name	**16BAL12 Beardmore Dam - Thuraggi Channel Repair**
Project Number	**16BAL12 - Maintenance Key_0000076381**
Project Description	**Beardmore Dam - Thuraggi Channel Repair**
Asset Type	Dam
Year(s) to be Delivered	2019
Cost	FY19: $1,338,120

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Beardmore Dam is the major storage for the St George Water Supply Scheme and is located 21 km upstream of the town of St George. The dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. The dam also has minor flood mitigation ability. Condition inspections reveal the outlet channel is at risk of failure, and requires repair to maintain agreed service levels.	None		Comprehensive Risk Assessment Renewals Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The current condition of the channel was determined to be a safety and operational risk that could put Sunwater in breach of their regulatory requirement under the St George Bulk Scheme. Several key conclusions from the Risk Assessment include: 1. There is evidence that an active piping process has developed within the foundation sands below the outlet structure; 2. The estimated probability of failure of the outlet structure is very high (1 in 6). The dominant failure mode is backward erosion piping through the foundation sands below the structure; 3. The societal risk for the outlet structure in its existing condition plots about half an order of magnitude above the limit of tolerability for existing dams, and therefore the risks are assessed to be unacceptable according to the ANCOLD guidelines; 4. Sunwater have already implemented interim risk reduction measures to manage the risk in the short term, and this includes operational restrictions on water levels in the channel, more frequent inspections and stockpiling of emergency materials at site; 5. The preferred upgrade option is to infill the channel downstream of the outlet structure. This option is predicted to reduce the risk to negligibly low levels.	None		Comprehensive Risk Assessment

Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Beardmore Dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. These works are required to maintain strategic alignment with SunWater's Corporate Plan and Statement of Corporate Intent which is to, "Operate and maintain SunWater's existing water infrastructure assets to ensure continued delivery of water to customers and communities in line with shareholder expectations." Ultimately seepage leading to instability of the dam embankment is a dam safety issue that needs to be addressed. A Needs Analysis by SunWater in the Detailed Options Analysis shows that the works are required to ensure compliance with ROP/ROL, Asset Management Policy, WH&S & Dam Safety, and Reputation.	None		Renewals Detailed Options Analysis
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified by the high risk of failure and subsequent potential impact to irrigation supply.	None		Comprehensive Risk Assessment
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Construction of the dam was completed in 1972. At the time of proposed works, the dam will be 47 years old. While the channel has not reached its expected asset life of 80 years, but Suwater has a strategy is to refurbish after 40 years.	None		Renewals Detailed Options Analysis
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Images taken clearly demonstrate erosion of sand potentially associated with piping of sands from the foundation. Active sand boils were documented in bed of channel and evidence of seepage besides outlet right bank training wall.	None		Thuraggi Channel Outlet Structure Final Report - Thuraggi Outlet Channel Geotechnical Investigation

Comment on Prudency	Beardmore Dam forms a critical part of the St George Bulk Scheme. Piping of the outlet right bank training wall among other issues such as erosion and sand boils present sufficient evidence that the dam's structural integrity is at risk. With a high chance of failure predicted for the dam (1/6 probability), it is evident that these issues must be rectified immediately. Given the consequence of dam failure both in terms of flood mitigation and irrigation supply, this project is therefore considered prudent.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were identified in the scoping phase. This includes: 1. Extend outlet culvert downstream; 2. Construct upstream clay blanket; 3. Construct sheet piling cut off; 4. Do nothing.	None		Renewals Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option was to proceed with Option 1. This involves construction of a base slab in the channel bed then installing two barrels of 1500 x 1500 box culverts for 40m. The channel would then be backfilled to effectively move the outlet 40 m downstream. A set of rockfill mattresses would be installed at the conduit exit for score control in the earth channel. This is supported as the long term remediation option in the Final Geotechnical Report.	None		Renewals Detailed Options Analysis Final Report
	Were/are non-capex options considered (such as operational solutions)?	YES	Not proceeding could lead to failure of the embankment resulting in SunWater being unable to supply water to customers in the St George Irrigation Area.	None		Renewals Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Preliminary and concept design drawings appear to be in accordance with industry standard. No detailed design drawings provided to assess. Detailed risk analysis and geotechnical report completed by relevant and qualified persons including external from Sunwater.	None		Preliminary Drawings 2016 August Concept Drawings 2018 June
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	A breakdown of the construction quotes were not provided, but based on the detailed scope of works and the competitive procurement process, it has been assuemd to be of reasonable cost. The original project cost estimate was significantly underestimated. An increase to budget was requested in January 2019, but does not appear to have been reflected in the CAPEX claim for FY19. For this reason, it has been assumed that the increase in budget has not been approved. As a result, the scope was been deemed not reasonable. A partial delivery of the scope may affect quality and efficiency of the overall project.	Major	Cannot be determined	Briefing Note Budget Increase Request 2018 November Briefing Note Budget Increase Request 2019 January Cost Summary 2018 February
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Requests for offer were published on 19 October 2018 and closed on 16 November 2018. Two offers were received, both of which were above the project budget. A budget increase request was subsequently submitted to match the market conditions.	None		Briefing Note Budget Increase Request 2019 January
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The breakdown in the Jan 2019 briefing note shows a reasonable percentage (185) of non-direct costs for FY19.	None		Cost Estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	A Project Management Plan was provided but was only partially completed.	Minor		Project Management Plan

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	The project is for one year only.	None		Briefing Note Budget Increase Request 2018 November Briefing Note Budget Increase Request 2019 January
Were options considered in determining the least cost or preferred option?	YES	The preferred option was chosen based on meeting the needs of the project to rectify the risks of failure due to piping of the dam.	None		Renewals Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Whole of life costs were not applicable to this assessment, it was based purely on capital expenditure.	None		Renewals Detailed Options Analysis
Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	A defined project scope has been provided and a detailed options analysis completed. While the procurement process appears to have been competitive, the two offers were not provided for review. It has been assumed that they match current market conditions and the initial project cost estimate was significantly underestimated. The scope and standard appear to be reasonable for the revised budget of $3,865,000, but the CAPEX claim of $1,338,120 does match this estimate. A partial delivery of the scope may affect quality and efficiency of the overall project. For
Efficient	YES
Documentation Quality	Medium

Project Name	**17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)**
Project Number	**17BBR02 - Maintenance Key_0000075187**
Project Description	**17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)**
Asset Type	Embankment
Year(s) to be Delivered	2020
Cost	FY19: $586,391

BBR-GOS-OSS

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Gattonvale Offstream Storage (GOSS) embankment is part of the Bowen Broken Rivers Water Supply Scheme, which includes Eungella Dam, Bowen River Weir. Water is harvested during flood periods and released back to the weir to meet water demands. In 2017, the site was damaged by Cyclone Debbie. Along the majority of the damaged section, the rock protection has moved downgradient within the storage forming a bench, with sliding enabled by the surface provided by the geofabric installed directly onto the embankment. This fabric has been rolled as a result of wave action, leaving the embankment material directly exposed to the waves. Within the damaged zone, limited notching of the embankment material has occurred. In the northeast corner of the embankment, the notching is significant with the embankment having been removed by wave action to the inner wheel track of the crest roadway, marginally reducing the width of the embankment at a few locations. Remedial works have been identified and planned under project 17BBR02. SunWater has scheduled re-armouring works of a 1,400m length of the storage inner wall in 2019. Until these works are completed, the storage is being operated at a reduced level.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Although GOSS is not referable under the Water Supply (Safety and Reliability) Act. When assessed in accordance with the Queensland Guidelines for Failure Impact Assessment of Water Dams (DERM, 2010), the impact in the event of failure of the embankment would be within a restricted area and population at risk is less than 2. However, SunWater has classified the storage as "Major" in terms of importance of the asset within the Bowen Basin Scheme due to the essential nature of the storage to supplement Bowen River Weir.	None		Annual Inspection Report

Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.			
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified as the operation of the weir and subsequent supply capability has been detrimentally impacted.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The GOSS was constructed in 2005. At the time of refurbishment, it will be 15 years old. Given that the damage was inflicted by extreme natural causes (Cyclone Debbie), an assessment of standard run-to-failure asset life expectancy is not applicable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Images from the Repair Works Memo and Annual Inspection Report clearly show the damages resulting from Cyclone Debbie. A risk assessment of the embankment identified a moderate risk in terms of financial and productions / operations.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report

Comment on Prudency	The Gattonvale Offstream Storage forms a critical part of the Bowen Broken Rivers Scheme. The embankment structure has experienced significant damage caused by Cyclone Debbie in 2017 and has since been operating at a reduced storage level. Access to the GOSS has also been impacted, with the erosion extending to the inner track. Based on the importance of the GOSS within SunWater's Bowen Basin Scheme and the extent of damaging to the embankment, this project is considered prudent.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	High level options comparisons of four options was undertaken. Options included: • Option 1 - Like for like replacement (geofabric, sand and gravel) • Option 2 – ArmorMax (turf reinforced and anchored mats) • Option 3 – Dumped rock riprap (bedding layer with stones and rock fragments dumped in place on top) • Option 4 – Other solutions (grass, soil cement, gabion, etc.) Option 3 was the preferred option using sand and gravel bedding.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option was the best option in terms of proven and expected performance and low cost.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
	Were/are non-capex options considered (such as operational solutions)?	NO	A do-nothing option was not considered appropriate	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Detailed technical specification provided with refences to appropriate standards.	None		Technical Specifications 2018 July
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		Technical Specifications 2018 July
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The project costs are within the original budget estimate, the scope was well defined, and the project used a competitive tender process for the contractor. For these reasons, the costs appear to be reasonable.	None		Evaluation of Quotes 2018 October Technical Specifications 2018 July
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Competitive tender was used for contractor. 2 bids received. Details of each bid were not provided, but were stated to be similar. Least cost bidder selected.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The non-direct costs appear to be approx 10%, which is low for typical civil Sunwater projects. It is likely due to Sunwater nominating the contractor as principal contractor.	None		Contractor Determinatino 2018 November
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	A project mangement plan, scoping document, or risk assessment was not provided.	Minor		
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	Insufficient information	Cost of each option were only discussed at high level.	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	Cost of each option were only discussed at high level. No options scoring method was used.	Minor		

Did the project consider whole of life costs, including future maintenance and operating costs?	NO	Options assessment did not discuss whole of life	Minor		
Have any potential efficiency gains been identified?	NO	None identified	None		

Comment on Efficiency	The project included a high level options analysis, and high quality technical specifications were prepared based on the preferred option. A high level original budget of $600,000 was set but no documentation was included to support it. The project underwent a competitive procurement process with two bids received. The project will be delivered with the contractor as principal contractor; therefore, Sunwater non-direct costs are expected to be low. The total planned CAPEX cost in FY19 is within the original budget and appears reasonable.
Efficient	YES
Documentation Quality	Low

Project Name	**18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)**
Project Number	**18BDK06 - Maintenance Key_0000075973**
Project Description	**18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)**
Asset Type	Transformer
Year(s) to be Delivered	2019
Cost	FY19: $123,706

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Burdekin Falls Dam Caravan Park and Dam facilities are powered via two Transformers TX11 and TX12. The transformers are 11KV/415V 300KVA and pad mount types. Transformer 12 (TX12) is located near the Dam Crest and it is suppling power to Dam facilities. The transformers are in poor condition and beyond their asset life. Failure of the transformer puts Sunwater at risk of failing its agreed service levels.	None		Scope of Works
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The transformers are required to maintain operation of the Burdekin Falls Dam Caravan Park and Dam facilities. An emergency generator is located in the Burdekin Falls Dam intake Structure which is providing back up power to dam facilities during a power outage. This generator can supply power to dam facilities via the Main Switchboard in case Transformer TX12 fails, but the emergency generator is a secondary and costly means of supply and it is not reliable source of energy for a long period of time. The transformer enclosures are also badly corroded and thus unprotected leading to a safety risk. They are also unbunded leading to an oil leak environmental risk.	None		Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	A needs analysis was completed and compliance/standard requirements for the transformers were identified as justification for the works including the ROP.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Based on the condition of the transformers, immediate replacement is justified.	None		
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The transformers were manufactured in 1980 and 1979. At the time of proposed replacement, the transformers will be approximately 40 years old, which is beyond the standard serviceable life of electrical equipment (per WSA 03 Section 1.2.6).	None		Scope of Works
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Images of the transformers demonstrate their poor condition.	None		Scope of Works

Comment on Prudency	Sufficient information was provided to demonstrate project prudency. The two transformers at Burdekin Falls Dam are critical to the operation of the Caravan Park and Dam facilities. Power is supplied by these transformers to Housing, Office, Workshop, Caravan Park, entertainment area, and dam facilities. The transformers were observed as being improperly maintained and subsequently in poor condition, requiring replacement. The replacement is justified to ensure compliance with the Resource Operations Licence.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	A detailed options analysis was completed for the Burdekn Falls Dam Power Transformers. Four options were identified in the scoping phase. These include: 1. Refurbishment and upgrade transformers; 2. Replace transformers; 3. Refurbishment of transformers at site; 4. Do nothing.	None		Renewals Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option was determined to be Option 2 as it scored the best compared to the options considered based on addressing the needs of the project, net cost, benefits, and risks.	None		Renewals Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	Based on the current condition of transformers if no preventative maintenance is undertaken, the transformers are going to breakdown and the Burdekin Haughton Water Supply Scheme will be disturbed. The consequences of not proceeding may be abything from regular inspections, oil test and analysis to transformer failure that requires transformer replacement. The lead time to supply new transformer is above 20 weeks.	None		Renewals Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Technical specifications were with reference to appropriate Australian Standards.	None		Specification Supply 2018 February Specification Install 2018 February
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		Specification Supply 2018 February Specification Install 2018 February
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The proposed expenditure appears to be reasonble for the scope of the project, based on the budget and expenditure breakdown provided. Project expected to be delivered on budget.	None		Cost Estimate 2018 June Project Management Plan
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Two offerors were invited to submit a quote for the supply and delivery of two substations to Burdekin Falls Dam. A quote was only received from [redacted] for a price of $78,000. The installation appears to have been sole sourced. Both quotes were within budget.	Minor		Procurement Process and Recommendation
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Indirect costs are less than typical Sunwater electrical costs.	None		Cost Estimate 2018 June Project Management Plan
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A suitable project management plan was implemented as a framework to manage risk and uncertainty at project inception.	None		Project Management Plan
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year delivery	None		
	Were options considered in determining the least cost or preferred option?	YES	The preferred option was the best cost.	None		

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	An appropriate MCA framework was adopted to assess the four options. The criteria for assessment include needs analysis, cost, risk, timing and benefit.	None		Renewals Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The preferred option, to replace the transformers, provided the most cost benefit. An additional 20 years service was identified compared to the next closest option which was refurbishing the transformers.	None		Renewals Detailed Options Analysis
Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	A defined project scope has been provided and a detailed options analysis was undertaken. The cost estimate in the Project Management Plan was detailed. While an attempt at competitive procurement was made, it appears only one quote per scope item were received. That said, the quotes were within the allocated budget. The project cost has been considered reasonable.
Efficient	YES
Documentation Quality	Medium

Project Name	**19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)**
Project Number	**19BBR05 - Maintenance Key_0000070052**
Project Description	**19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)**
Asset Type	Building
Year(s) to be Delivered	2019
Cost	FY19: $228,000

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	Toilet Block 1 is a compost system that is part of the amenities at Eungella Dam. It was installed in 1993 and was last valuated in 2008. In 2018, it was totally destroyed by a fire and subsequently requires replacement to restore amenity to the area. There is no business case to confirm how it is tied to service levels.	None		QCA Information request A40_Summary of support information (4).xlsx QCA Information request A40_Remaining projects supporting information.xlsx QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The toilet facilities are necessary to provide sanitation. This project addresses compliance obligations regarding safety with respect to hygiene and basic health.	None		QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to reinstate the toilet block.	None		QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Since the toilet block was affected by an external fire hazard, the actual asset life cannot be compared to the standard run-to-failure life expectancy.	None		QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The most recent condition assessment of the asset was completed in 2018. The toilet facility was given the worst possible rating of 6, which reflects the destroyed state that it is in as a result of fire.	None		QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx

Comment on Prudency	Toilet Block 1 at Eungella Dam was completely destroyed by fire in 2018. This project was initiated to replace the toilet block and restore the area's amenity. Given the importance of toilet facilities for general health and wellbeing, including proper sanitation, the project is considered to be prudent. Sunwater need to clarify the anticipated expenditure date and cost for this project.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the age of the pump it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration. The consequences of not proceeding would form part of the justification for progressing with the toilet block replacement.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Different options for toilet types should be investigated.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	NO	No non-capex options were considered.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No works completed or proposed to assess standard conforms with industry best practice.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The replacement cost for the toilet block and grewywater pump based on its 2008 valuation is $236,952 in $FY19.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.			
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	N/A	No options assessment has been undertaken.			
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.			
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.			
	Have any potential efficiency gains been identified?	N/A	None identified			

Comment on Efficiency	For the proposed toilet block replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost of the project is close to the asset register replacement value and is therefore considered reasonable.
Efficient	YES
Documentation Quality	Low

Project Name	**Refurbish Pump 1 - Gattonvale PSTN**
Project Number	**19BBR09 - Maintenance Key_0000069873**
Project Description	**Refurbish Pump 1 - Gattonvale PSTN**
Asset Type	Pump
Year(s) to be Delivered	2025
Cost	FY19-20: $70,000 FY21-24: $0 FY25-53: $451,000

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The model C3531/985 Flygt pump at Gattonvale Pump Station was installed in 2005. It is proposed this pump, Pump 1, is refurbished in FY19 and every 6 years thereafter for an estimated cost of $70,000-$92,000 per refurbishment. The works are required to follow the asset management strategy for a low risk asset and maintain the pump station in service.	None		QCA Information request A40_Summary of support information (4).xlsx QCA Information request A40_Remaining projects supporting information.xlsx QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	None identified. The criticality of the pump station in the irrigation scheme should be identified.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above.	None		
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	The pump refurbishment frequency is appropriate, but the timing does not match the installation year of the pump. Furthermore, the impacts of future pump replacement cycles are no accounted for.	Medium		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Low risk pumps are refurbished on a 6 year cycle or upon failure.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	Insufficient information	There was no condition assessment documented for Pump 1 at Gattonvale Pump Station. The refurbishment cannot be justified based on its condition due to lack of information.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Refurbishment of the pump is justified based on asset management strategy for 6-year refurbishment cycle for a low risk asset. In this regard, the project's prudency is demonstrated; however, the timing of the proposed refurbishments do not align with the install date of the pump. Without information on the date of the last refurbishment, a revised schedule is recommended to match the asset strategy. Furthermore, the replacement cycles were not accounted for in the refurbishment cycle. As such, an unnecessary extra year of refurbishment was included.
Prudent	NO
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process nor are there any details of scope of refurbishment. The cost of refurbishment appears to be 4x higher than replacement.	Medium		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	None described	Minor		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	None described	Minor		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	There are no cost basis for the refurbishment.The proposed cost of refurbishment also does not match the replacement value in the asset register. The cost of refurbishment should be less than that of replacement. The asset register replacement value is $18,378 valued in 2015. In $FY19, this is $19,656. Assuming refurbishment is 50% of the cost of replacement, the cost would be $10,000. Furthermore, the refurbishment cycle should account for 30-year replacement cycle. A pump does not need refurbishment in the year that is replaced.	Major	FY19-20: $70,000 FY21-24: +$10,000 FY25-53: $411,000	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	No information provided. As a refurbishment was planned in FY19, there should be a scope, cost, and procurement details available.	Minor		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Have any potential efficiency gains been identified?	NO	None identified	Minor		

Comment on Efficiency	A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. The proposed refurbishment costs do no align the replacement costs as documented in the asset register. Three adjustments are recommended – one for the timing of the refurbishments, one for removing a refurbishment close to the year of replacement, and one for the individual cost of a refurbishment.
Efficient	NO
Documentation Quality	Low

Project Name	**Refurbish Hydraulic System and cylinders - Stage 3**
Project Number	**19BDK01 - Maintenance Key_0000074061**
Project Description	**Refurbish Hydraulic System and cylinders - Stage 3**
Asset Type	Hydraulics
Year(s) to be Delivered	2020
Cost	FY19-20: $247,070 FY21-24: $0 FY25-53: $426,370

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Clare Weir on the Burdekin River at Clare has 150 hydraulically operated flap gates on the weir crest to provide an increased upstream pool level for pump stations of the Burdekin Irrigation Area. Failure events were recorded in 2012 and 2013. Risk and condition assessments of the asset have classified the asset as having an "extreme" risk with the gate seals and cylinders requiring refurbishment to reduce the risk to an acceptable level. Therefore, it is proposed that the hydraulic system and cylinders are Clare Weir are refurbished starting in FY20. This project forms part of a rolling program which is currently at "Project Phase 4 - Preliminary Design".	None		QCA Information Request A40_Remaining projects supporting information.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Operation of the gates are necessary to maintain upstream water level at Clare Weir. Previous failure in 2012 and 2013 have resulted in several hazards identified. These include: - Failure of the weir; - Failure of a gate bank; - Failure of a single gate; - Unsafe access; - Oil loss to environment; - Impairment of fishway function. This project aims to rectify these hazards. Failure to do so puts Sunwater at risk of breaching their regulatory requirement to manage water under the Burdekin Haughton Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Clare Detailed Options - Renewal of Flap Gates
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	As this project is part of a rolling refurbishment and condition has confirmed urgent need, the timing is considered appropriate.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The hydraulically operated flap gates were installed in 1984. They undergo minor yearly maintenance. At the time of the proposed refurbishment, the flap gates will be 36 years old. The typical serviceable life for mechanical equipment is 20 years, and so the gates will have exceeded the standard run-to-failure asset life expectancy. Sunwater's asset strategy for hydraulic systems is to maintain into perpetuity by undertaking periodical refurfishments based on condition and risk.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A high-level condition assessment was completed in 2015 for the gate cylinders. They were rated as level 4, which is fair to poor condition. This is supported by the March 2014 inspection report.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Sufficient information was provided by Sunwater regarding the refurbishment of the flap gates at Clare Weir. The failure history, hazard assessment, and condition inspection inform the need for the project. The refurbishments form part of rolling works to reduce the high level of risk currently identified for the weir to an acceptable level. In this regard, the project's prudency is demonstrated.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Several options were identified to address the risks, including: 1. Removal of the gates and lowering of the weir; 2. Permanent raising of the weir; 3. Refurbishment of mechanical equipment by a contractor; 4. Refurbishment of mechanical equipment by SunWater direct management; 5. Do nothing; 6. Addition of PLC and SCADA control to the weir.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Clare Detailed Options - Renewal of Flap Gates
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The recommended option to proceed with is Option 3, a project to procure 29 hydraulic cylinders to give a total of 36 spare, then swap out a bay of cylinders at a time for refurbishment while also replacing the seals and hoses on each gate in the bay. An MCA was used to select Option 3.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Detailed options analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however disregarded as it would put Sunwater at operational risk and in breach of their regulatory requirements under the Burdekin Haughton Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The cylinder technical specification provides appropriate standard of works.	None		Specification Hydraulic Cylinders 2018 September
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		Specification Hydraulic Cylinders 2018 September
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None documented		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The Options Analysis estimated a cost of $2,550,000 for a rolling program. The CAPEX claim is for a single year (once in FY20 and then again in FY50), and appears to not match the scope of the options analysis. However, considering the quality of the options analysis, the technical specification, and the procurement process, it has been assumed the costs are reasonable despite the lack of information on actual scope.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	A competitive tender was completed with 4 bids received and three being technically compliant. The details of the individual bids were not provided, therefore it cannot be confirmed the preferred bidder was within range of the other bids.	Minor		Procurement Process & Rec 2019 March
	If not, why?	Refer above		Minor		
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered in the FY20 and FY50 claims.	Minor		
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	Minor		

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on cost escalation has been provided, however, the CAPEX claim is for a single year.	Minor		
Were options considered in determining the least cost or preferred option?	YES	The least cost option was not selected, as an MCA was used.	None		Clare Detailed Options - Renewal of Flap Gates
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The least cost option was not selected, as an MCA was used.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	An NPV calculation including OPEX was performed.	None		Clare Detailed Options - Renewal of Flap Gates
Have any potential efficiency gains been identified?	NO	None identified	None		

Comment on Efficiency	For the proposed hydraulic cylinder refurbishments, there is insufficient information provided to comment on project efficiency. The CAPEX claims in FY20 and FY50 do not match the concept of a rolling program nor do the cost estimates correlate with those from the options analysis. It appears that the amounts have only been allocated to fund a portion of the cylinder refurbishments and the remaining cylinders would be refurbished under a separate project. With this assumption, and given the quality of the options analysis and procurement process, the project costs have been assumed as reasonable.
Efficient	YES
Documentation Quality	Low

Project Name	**Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)**
Project Number	**19BUN10 - Maintenance Key_0000067246 and 0000076177**
Project Description	**Reinstate 10 refurbed and build& install 10 new shutters at Ben Anderson Barrage (#2242651)**
Asset Type	Shutters
Year(s) to be Delivered	2019 / 2020
Cost	$383,000 / $297,000

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	During the January 2013 floods, the Ben Anderson Barrage was severely damaged. Flood water inundated the site causing damage to the entire site infrastructure. This included the collapsible steel shutters, which are designed to collapse when the storage level exceeds 0.3m above full supply level (FSL). Emergency civil works were commenced to remove 20 shutters to commission the barrage to an operational standard, but more work is required for the shutters under the renewals budget. This project is part of a longer term annual strategy to restore shutters.	None		QCA Information Request A40_Remaining projects supporting information.xlsx Business Case
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Ben Anderson Barrage forms a critical part of water supply under the Bundaberg Bulk Scheme. Without the shutters, storage at Ben Anderson Barrage will be decreased. This project also aligns with SunWater's statement of corporate intent, which is to maintain the structural integrity of Sunwater's infrastructure.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Business Case
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.			
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified to ensure compliance of Ben Anderson Barrage with the requirements under the Bundaberg Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The steel shutters were first installed in 1984. At the time of proposed refurbishment, they will be 35 years old. The expected operational life of the new shutters is 40 to 50 years, which are improved versions of the existing. Based on this, it is assumed the existing shutters have reached the end of their life standard expectancy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A high-level condition assessment was completed in 2015. At the time, the shutters were given an overall rating of 4, which represents poor condition. Some shutters were rated as 5, nearing failure, due to heavy corrosion. The condition assessment therefore supports these works. The shutters were given a moderate risk rating, with additional pumping costs and potential lower water allocations the result of not proceeding with refurbishments.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Comment on Prudency			Sufficient information was provided by Sunwater regarding the proposed replacement of 20 (out of 110) collapsible steel shutters at Ben Anderson Barrage. Replacement is justified based on the poor condition of the shutters and the criticality of their role in storage capacity within the Bundaberg Bulk Scheme. The replacement option was deemed to increase asset life, reduce operational risks, and whole of life costs. In this regard, the project's prudency is demonstrated.			
Prudent			YES			
Documentation Quality			High			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Three options were identified as documented in the Business Case for this project. These include: 1. Swap out and refurbish 10 shutters each shut down 2. Fabricate 10 new shutters and then have 20 shutters ready for swap out 3. Do nothing.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Business Case
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	It was recommended in the Business Case that approval be given for Option 2 to proceed, which includes redesign, fabrication and installation of 10 new shutters and involves the following works: - Contractor design - investigation and redesign of the shutters; - Presentation of three price options for the fabrication of the shutters; Sunwater to choose the preferred option, based on price, maintainability and expected life; - Fabrication of 10 new shutters; - Installation of the 10 new and 10 already refurbished shutters. Option 2 is the preferred option for the following reasons: - It provides a long term solution to ongoing corrosion; - It provides a much longer life of each new shutter compared to the remaining life of refurbished shutters. It is expected to receive a 20 year life warranty from the fabricator and an expected 40 to 50 year life of the new shutters, compared to an expected 10 year remaining life of refurbished shutters; - Fabricating new shutters is not much more expensive that refurbishment but provides twice or more the life; - The current budget comfortably allows for this option.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Business Case
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however disregarded as the consequence of not proceeding would delay the progress of rectifying the corrosion issues which currently affect the shutters. Corrosion is an ongoing issue that requires refurbishment approximately once every 10 years. Doing nothing increases the likelihood of large leaks or failure of the shutters. The consequence of this is a loss of storage capacity of the barrage. That said, it was also mentioned that the shutters may not be needed pending an outcome on the Paradise Dam in FY19. No further information was provided on the Paradise Dam consideration, but it could deem the entire project unecessary.	Major	Potential to cancel entire program	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Business Case
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The proposed designs by [redacted] appear to conform with industry standard. RPEQ involvement.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Switching to the replacement strategy (From refurbishment) has a lower whole of life cost.		None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	Cost estimates were provided for the FY18 Budget Setting and 2019 Delivery. The initial budget estimate was up to $461,396 including 10% contingency. The subsequent estimate of cost was $249,176. The FY19 claim of $383,000 is higher than the busienss case budget of $249,176, and no justification was provided. An adjustment is recommended. The FY20 budget is closer to the $249,176 total. When adding installation and additional shutters (from 8 to 10), the FY20 budget appears reasonable.	Medium	FY19:$133,726	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	A procurement evaluation plan for RFO16SW4836 was provided and responses were documented from [redacted]. The figures appear to be for rolling works over 2017-19. While competitively tendered, only one bid was received. The successful company was then sole sourced the proposed replacement works.	Minor		Offer Recommendation Report
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The indirect costs provided in the cost estimates appear to be reasonable for the project scope.	Minor		Cost Estimates
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	A project management plan or risk assessment was not completed for this project.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	This is a two year program so cost escalation impacts are minor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	YES	The preferred option was the most expensive, however similar in price to the alternative (other than the do-nothing option) and presented significant increases in benefit from a whole of life perspective.	None		Business Case
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The options were assessed against a MCA framework. The criteria (benefits, timing, net cost customer/client impact, risks) and weighting for assessment are considered to be appropriate for the scope of works.	None		Business Case
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The key driver for proceeding with Option 2 was the efficiency of capital expenditure. Spending more upfront would result in longer asset life and therefore decrease the need for future expenditure to achieve the same outcome.	None		Business Case
Have any potential efficiency gains been identified?	YES	Efficiency of capital expenditure was identified as reducing the net cost of the project.	None		Business Case

Comment on Efficiency	A defined project scope was provided with clear consideration for alternative strategies. The preferred refurbishment option had the highest capital expenditure, however presented project efficiencies which would in turn result in least net costs over the project lifetime. Detailed cost estimates, including supplier quotes for the shutters, were provided and appear reasonable. The expenditure cost claim in FY19 was $133,726 higher than the cost estimate without explanation; therefore, an adjustment is proposed.
Efficient	NO
Documentation Quality	Medium

Project Name	**Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir**
Project Number	**19CHW03 - Maintenance Key_0000076554**
Project Description	**Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir**
Asset Type	Weir
Year(s) to be Delivered	2019
Cost	FY19: $75,000

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	NO	Chinchilla Weir forms a critical part of the Chinchilla Weir Scheme. This study is proposed to develop a recreational use storage management plan. It is unclear from the information provided what the driver for this study is.	Major	$75,000	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	NO	Refer above.	Major	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	NO	Refer above.	Major	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	Refer above.	Medium	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Standard run-to-failure asset life expectancy does not apply to this project. The weir was constructed in 1973. At the time of the study, the weir will be 46 years old.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	Condition assessments were completed for various aspects of the weir ranging from in 2012 to 2019. Generally the weir is in good to fair condition overall. There is a moderate risk rating for the weir in regard to WH&S, Production/Operations. Although it is unclear how a study on the recreational use relates to the asset.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	More information is required from Sunwater regarding recreational use storage within the Chinchilla Weir Scheme. Background information pertaining to the weir was not supplied, nor was justification for recreational use storage. Project prudency is not justified based on the documentation provided.
Prudent	NO
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	Not application as this is a study regarding storage management plan.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	Unable to assess proposed cost as it is a high level estimate. There is no defined project scope to make an informed assessment.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	Storage management plan would likely be an internal Sunwater project.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	N/A	No options assessment has been undertaken.	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.	None		
	Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	For the proposed study for recreational use storage management plan, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. More information is required to assess the project's efficiency.
Efficient	Insufficient information
Documentation Quality	Low

Project Name	**Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervious fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)**
Project Number	**N/A - Maintenance Key_0000057410**
Project Description	**Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervious fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)**
Asset Type	Weir
Year(s) to be Delivered	2021
Cost	$50,800 ($FY19)

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Cunnamulla township receives water supply from the storage at Allan Tannock Weir. An emerging issue at Allan Tannock Weir was raised at the Toowoomba Office during the annual budget meeting. During an inspection when the water levels were lower, it appears that the protection concrete on the upstream side of the sheet piling has been undermined. This project was initiated to repair the weir to its original design. In addition to repairing the rock apron, works are required to unblock the weep holes and reinstate the broken rock mattresses.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Undermining of the weir may worsen to the point of structural failure. Without intervention, it may result in a risk to the long term water security of Cunnamulla.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to repair the weir.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	The weir was constructed in 1992. At the time of proposed repair, the weir will be 29 years old. Typically, unreinforced concrete has a design life of 50-100 years, however it was noted that wave action has caused the condition to worsen progressively with time. With the loss of supporting soil, the concrete condition has deteriorated considerably in the time since it was poured.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Site inspection photos adequately represent undermining of the weir and resulting damaged concrete protection.	None		Business Case

Comment on Prudency	The Allan Tannock weir provides storage of water and supply to the township of Cunnamulla. The rock protection at the weir was designed to protect the sheet piles. Immediate repairs are required to reinstate the rock protection to its original condition to prevent further damage to the sheet piles and overall dam structural integrity. The 5-Yearly Dam Inspection also recommended repairs to the rock mattresses and weep holes.
Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the condition of the rock protection it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2021. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	Design details have not yet been completed.	Minor		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Design details have not yet been completed.	Minor		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Design details have not yet been completed.				
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	Draft cost estimates were provided by Sunwater, which show the predicted expenditure as being $37,000 with an additional $10,000 for rock mattress repairs. When converted to $FY19 and planned in FY21, the total is $49,600. The CAPEX claim of $51,000 (in $FY19) does not match. A slight adjustment of $1,400 is recommended so that it matches the only cost estimates available.	Minor	$1,400	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	NO	The early cost estimates do not include allowances for indirect costs.	Medium		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	No scope of works document has been prepared hence risk management has not been assessed.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Have any potential efficiency gains been identified?	NO	None identified.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January

Comment on Efficiency	For the proposed rock protection replacement, unblocking of weep holes, and rock mattress reinstatement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. An adjustment of $1,200 to the CAPEX claim has been made such that it matches the cost estimates provided.
Efficient	NO
Documentation Quality	Low

Project Name	**Replace Crane Control Equipment**
Project Number	**N/A - Maintenance Key_0000064960**
Project Description	**Replace Crane Control Equipment**
Asset Type	Crane
Year(s) to be Delivered	2024
Cost	FY21-24: $154,440 FY25-53: $167,250

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	It is proposed that the crane control equipment at Leslie Dam is replaced in 2024 for an estimated cost of approximately $160,000 (in 2024 and 2044). Leslie Dam forms part of the Upper Condamine Scheme.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	According to Sunwater's Overall Strategy Common to all Bulk Water Schemes by Object Type, cranes are considered under Existing Developed Strategies. Cranes and lifting equipment are replaced on a 30 to 80-year internal and refurbished after 6 to 20 years based on condition, risk and object type. The control system has a typical life of 15-20 years. A crane control sytem is critical to its safe operation.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Bulk Water Schemes by Object Type
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Based on the age of the crane, it is likely the timing for replacement is appropriate.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The crane was acquired in 1985. The typical serviceable life for electrical and mechanical equipment as defined in WSA 03 (Section 1.2.6) is 15 and 20 years respectively. At the time of the proposed replacement, the crane will be 39 years old and will have exceeded the standard run-to-failure asset life expectancy. This is also in accordance with SunWater's existing strategy per Overall Strategy Common to all Bulk Water Schemes by Object Type.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Bulk Water Schemes by Object Type
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A high level condition assessment completed in 2019 indicates the gantry crane switchboard internal components is in overall condition of 3, which is fair, with some components rated 4 indicating some aspects are in poor condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Sufficient information has been provided in regard to the proposed replacement of control equipment at Leslie Dam. Replacement of the equipment is justified based on the age of the asset having exceeded the typical serviceable life for mechanical/electrical equipment. Sunwater's Existing Strategy for Crane Equipment is supported by their Overall Strategy Common to all Bulk Water Schemes by Object Type. In this regard, the project's prudency is demonstrated.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the age of the crane and control equipment it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2024. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Information provided in QCA Information Request A40_Attachment1_asset Register Including Condition and Risk as at 5 June 2019.xlsx does not identify a replacement cost for the control equipment at Leslie Dam. However, replacement costs for similar items in the register indicate figures between $115,000 and $200,000 are likely. Therefore, the proposed expenditure of $160,000 appears reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	N/A		None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.	None		

Did the project consider whole of life costs, including future maintenance and operating costs?	YES	This project forms part of SunWater's existing strategy for assets part of the Bulk Water Scheme.	None		
Have any potential efficiency gains been identified?	N/A	A detailed cost estimate with breakdown has not been provided.	None		

Comment on Efficiency	For the proposed crane control equipment replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be determined. That said, the $160,000 replacement cost appears to be close to replacement costs for similar assets.
Efficient	YES
Documentation Quality	Low

Project Name	**Stabilise bed and banks of the spillway discharge channel subject to dam safety review**
Project Number	**N/A - Maintenance Key_0000072774**
Project Description	**Stabilise bed and banks of the spillway discharge channel subject to dam safety review**
Asset Type	Spillway
Year(s) to be Delivered	2024
Cost	FY21-24: $350,900 FY25:53: $292,708

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	NO	Teemburra Dam supplies water to the Pioneer Valley irrigation system and for urban and industrial purposes in the region. It is proposed that the bed and banks of the spillway discharge channel are stabilised (per the recommendations of the dam safety review) with costs in 2024 and 2049. The January 2018 Dam Safety Review did not include a recommendation for this project.	Major	$643,680	QCA Information Request A40_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	NO	The Teemburra Dam is assessed as having an Incremental Flood Consequence Category (IFCC) rating of extreme based on major damage. The January 2018 Dam Safety Review did not include a recommendation for this project.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	NO	Refer above.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	End of life for concrete channel expected near 2077. No condition inspection information to support earlier refurbishment/replacement.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	Construction of Teemburra Dam was finished in 1997. The typical service life of concrete is 80-100 years.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	NO	A high-level condition assessment was completed in 2003. The condition was documented as level 2, which indicates it is in good condition with minor defects only.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Comment on Prudency		The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.			
	Prudent		NO			
	Documentation Quality		Medium			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2024. The appropriateness cannot be commented on at this stage, based on the information provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	Insufficient information	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No works completed or proposed to assess standard conforms with industry best practice.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	No information				QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	Unable to assess proposed cost as it is a high level estimate. There is no defined project scope to make an informed assessment.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	If not, why?					QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were options considered in determining the least cost or preferred option?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Have any potential efficiency gains been identified?	Insufficient information	A detailed cost estimate with breakdown has not been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Efficiency	The project did not form part of the recommendation from the January 2018 Dam Safety Review. As such, there has been definition of scope, standard, or cost. There is insufficient information provided to comment on project efficiency. The full amount of the project should be adjusted due to lack of project prudency.
Efficient	Insufficient information
Documentation Quality	Low

Project Name	**Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake**
Project Number	**N/A - Maintenance Key_0000073006**
Project Description	**Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake**
Asset Type	Building
Year(s) to be Delivered	2022
Cost	FY21-24: $285,450

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	NO	It is proposed that refurbishment works to the Kinchant Dam inlet tower be done in 2022 for an estimated cost of $285,450 ($FY19). The works involve a major refurbishment to strengthen (post tensioning) the structure against damage from an earthquake. This was recommended from the 2000 dam safety review. The inlet tower is critical to the operation of the Dam and the ability to meet service levels; however, it is also unclear why the project won't be actioned until 22 years since the issue was identified. For this reason, it is assumed as a low risk to affecting service levels.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	It is assumed, but not confirmed, that the project is as a result of changes to seismic design standards in 1993 from when the tower was constructed in 1986. It was stated to be identified in a 2000 Dam Safety Review but this documented was not provided. Australian seismic standards (AS1170.4) was revised again in 2018, which effectively reduced seismic design requirements. This may have affected the original 2000 recommendation for structural improvements. Until a new seismic design review is completed, the project should not be considered prudent.	Major	$285,450	QCA Information Request A40_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above	Medium		QCA Information Request A40_Remaining projects supporting information.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	It is also unclear why the project won't be actioned until 22 years since the issue was identified. Structural integrity of a critical structure should theoretically have been a higher priority.	Medium		QCA Information Request A40_Remaining projects supporting information.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	The asset is not near the end of life. This project appears to be related to modernisation of the structure to meet current codes.	None		QCA Information Request A40_Remaining projects supporting information.xlsx

	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	The asset is in good condition. This project appears to be related to modernisation of the structure to meet a revised code, but this could be outdated yet again.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
Comment on Prudency			While the tower appears to be in good condition, it appears that the 2000 Dam Safety Review identified unacceptable structural integrity for seismic resistance of the structure. It is assumed that this in response to the updated seismic codes in 1993. The delay in project implementation of 22 years suggest the project was of low priority and did not affect overall risk of the dam. Furthermore, the seismic standards have been updated in 2018 and what may have been prudent in 2000 could have changed. The project has not been considered prudent until an appropriate review of current standards is done.			
Prudent			NO			
Documentation Quality			Low			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	The project appears to be proposed to modernise the structure to meet current seismic codes.		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	It is assumed the cost was derived from the 2000 Dam Safety Review, but this document was not provided to confirm.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	NO	No detailed cost estimate has been provided to determine whether indirect costs have been considered. An options study was proposed for FY20 (i.e. indirect costs) but no funding has been allocated in that year.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided. The project appears to have been postponed as it was originally identified 22 years prior to its planned implementation.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Have any potential efficiency gains been identified?	Insufficient information	None identified	None		

Comment on Efficiency	For the proposed tower refurbishment/strengthening, there is insufficient information provided to commentary on project efficiency as no supporting documentation was provided and no data from the asset register is applicable. It is unclear whether the allocated funds were for a design study or for construction.
Efficient	Insufficient information
Documentation Quality	Low

Project Name	**Refurbish Silverleaf Weir**
Project Number	**0000076200 & 0000076201 Maintenance Keys**
Project Description	**Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1**
Asset Type	Weir
Year(s) to be Delivered	2020 & 2021
Cost	FY20: $939,980 FY21: $1,861,760

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	While there is nothing documented on the service levels that the nominated infrastructure supports, it is reasonably implied that there remains a business need for the weir, however this should be documented in the project justification.	None		Non Routine Work Initiation Justification Document Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
	Were/are the works reasonably required to address a legal or compliance obliation with safety, environmental or other legislative requirements?	YES	Based on the condition and risk assessment and the remaining life, it is reasonably implied that there is a safety risk attached to the project.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	As above, it is reasonably implied but project justification should specifically cover this.	None		Non Routine Work Initiation Justification Document
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Based on the results of the condition assessment, the weir requries urgent restoration. While, due to the phase of the project, the proposed option has not been selected, the timing of the expenditure based on the remaining life (2-4 years from 2018) is prudent.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The asset life remaining assessed in the condition assessment (2-4 years) which would bring the total asset life to approximately 75 years. Based on the materials of construction (timber etc), this would be considered to be consistent with typical asset life expectancy.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	As above	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018

Comment on Prudency	The project is deemed prudent as it can be reasonably implied there is a safety risk attached to the failure of the Silverleaf Weir and a business need for the safe functioning of the weir. The option has not been chosen yet and the scope of works is to be defined by the 2018 Options Study. It is reasonably implied the scope of works will fulfil regulatory obligations.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	The condition assessment completed in 2018 included various restoration recommendations. A proposed FY18 Options analysis will exploure higher level options of: 1. Do nothing 2. Upgrade the weir 3. Rebuild the weir 4. Refurbish and replace certain components 5. Decommision the weir Documentation of the Options Analysis was not provided to show what options were actually considered.	None		
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Options not assessed yet.	None		
	Were/are non-capex options considered (such as operational solutions)?	N/A	Options not assessed yet.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	Options not assessed yet.	None		
	Is the standard if works compatibile with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Options not assessed yet.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	N/A		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	The design and construction phase has been scheduled for FY20 and FY21 with costs of $939,980 and $1,862,000 respectively. The total combined cost is $2,802,000. The QCA Information Request A40_refurbish Silverleaf Weir supporting information document states that the cost estimate was based on a similar restoration to Whetstone Weir in FY10 and was scaled up in consideration of size, level of decay, locality, and inflation/escalation. The asset register replacement value for the weir and all its components is $2,523,227 using a 2015 valuation. In $FY19, this is $2,698,692. However, it is noted that not all of the weir components were populated with replacement values.	None		Asset Register
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	Scope not yet determined	None		
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	The cost estimate is based on previously project cost, so it should cover the allowance for indirect costs, but there is no supporting information.	None		

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The project is in initiation stages and risk management generally minimal from a project perspective during initiation. Based on the most recent condition assessment noting that the timber elements are at failure stage, there would be a potential risk of failure prior to execution of the work which would need to be assessed / monitored.	None		
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Sunwater has stated that they have applied a cost index to the scaled cost estimate, but no supporting information was provided.	None		
Were options considered in determining the least cost or preferred option?	Insufficient information	Options not assessed yet.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	As above	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	As above	None		
Have any potential efficiency gains been identified?	Insufficient information	None yet identified	None		

Comment on Efficiency	Based on the early phase of the project, and prior to options being assessed, there is insufficient information to comment fully on the efficiency of the project. However, the proposed project process indicates the project should result in overall efficiency being delivered on the project. The cost estimate was established by scaling costs from a previous similar weir restoration project. The costs appear to be reasonable in comparison to available replacement values in the asset register.
Efficient	YES
Documentation Quality	Low

Project Name	**Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)**
Project Number	**N/A - Maintenance Key_0000076580**
Project Description	**Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)**
Asset Type	Dam
Year(s) to be Delivered	2020
Cost	FY20: $286,549

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	N/A	The Sunwater Executive Leadership Team (ELT) has identified Fairbairn Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to Survey (not necessarily limited to bathymetric) required to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Identified features within the pondage storage area subsequently required to be addressed accordingly in the interest of public safety on the lake. It doesn't appear to be directly related to delivery of agreed service levels. It is related to public safety.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx Non Routine Work Initiation Justification Document
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified as public safety and business reputation is a risk factor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	This project does not propose changes based on asset life.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	This project is unrelated to asset condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Fairbairn Dam is recognised as an area used for public recreation. This project has been initiated to determine accurate depths, features and types of hazards in the lake that pose a risk for the various recreational users. Given the risks these hazards may pose to the public, it is considered prudent for the survey to be completed.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice. The proposed method for survey appears reasonable for the scope of works.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The cost estimate for this project was based on an estimate from a Sunwater project manager. The initial estimate was $317,500, with an estimate confidence of +/-15%. The cost claim is $292,280 (noimnal $) is within this confidence range and is therefore considered reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	The project is for a survey. No O&M involved.	None		
	Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency. That said, the CAPEX claim is within the accuracy bound of the cost estimate provided by the Sunwater project manager and appears reasonable for a survey of 2000 ha.
Efficient	YES
Documentation Quality	Low

Project Name	**Study: Bathymetric survey of Bjelke Petersen Dam (ELT directive - see notes)**
Project Number	**N/A - Maintenance Key_0000076581**
Project Description	**Study: Bathymetric survey of Bjelke Petersen Dam (ELT directive - see notes)**
Asset Type	Dam
Year(s) to be Delivered	??
Cost	FY21-24: $46,840

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Executive Leadership Team has identified Bjelke-Petersen Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to Survey (not necessarily limited to bathymetric) required to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Identified features within the pondage storage area subsequently required to be addressed accordingly in the interest of public safety on the lake.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified as public safety is a risk factor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	This project does not propose changes based on asset life.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The project is unrelated to condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Bjelke-Petersen Dam is recognised as an area used for public recreation. This project has been initiated to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Given the risks these hazards may pose to the public, it is considered prudent for survey to be completed so that dam-users may use it safely.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	There is no defined project scope to make an informed assessment. However, based on the cost estimate from a similar survey study at Fairbairn Dam, when scaled based on reservoir area, the proposed capital expenditure claim appears to be reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	The project is for a survey. No O&M involved.	None		
	Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency. That said, the CAPEX claim, when scaled based on reservoir area, is within the range of a similar survey proposed at the Fairbairn Dam which had a cost estimated associated with it. It is therefore assumed efficient.
Efficient	YES
Documentation Quality	Low

Project Name	**Testing of post tensioning permanent strand anchors**
Project Number	**N/A - Maintenance Key_0000077561**
Project Description	**Testing of post tensioning permanent strand anchors**
Asset Type	Dam
Year(s) to be Delivered	2019
Cost	FY24-53: $673,000

Assessment Notes

- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Tinaroo Dam forms part of the Mareeba-Dimbulah Bulk Scheme. Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003).	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.			
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refore above.			
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Five yearly testing is appropriate. However, more frequent tests should be undertaken if the permanent strand anchors show signs of deterioration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Tinaroo Dam was constructed in 1959. At the time of the testing, it will be 60 years old.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A condition assessment of the spillway anchor prestress system was completed in 2015 in accordance with the five yearly inspection requirement (ANCOLD Guidelines, 2013). The system was rated as being in good to fair condition which supports the continuation of testing at its current schedule.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003). The previous condition assessment of the asset indicates that the existing inspection schedule is suitable. This project is considered prudent to meet Dam Safety Requirements.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A	Testing is required to meet Dam Safety Requirements. An options analysis is not applicable to this project.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.			
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	N/A				QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A				
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	N/A	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	N/A	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	N/A				
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.			
	Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.			
	Have any potential efficiency gains been identified?	N/A	A detailed cost estimate with breakdown has not been provided.			

Comment on Efficiency	For the proposed testing of post tensioning strand anchors, there is insufficient information provided to comment on project efficiency but the costs appear to be reasonable. They range in value from $105,000 to $120,000 (in $FY19) per test.
Efficient	YES
Documentation Quality	Low

Appendix G

Assessment Forms for Dam Safety Upgrades

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Project Name	**Burdekin Falls Dam - Dam Safety Improvement Project**
Project Number	
Project Description	**dam safety upgrade for Burdekin Falls Dam**
Asset Type	Water supply dam for Townsville and other areas.
Year(s) to be Delivered	not provided
Cost	FY19-20: $12.7M FY21-24: $284M FY25: $35.1M

Assessment Notes

- Currently in concept design phase. Sunwater developing a Preliminary Business Case.
- Studies still in progress to inform the risk assessment, position of the F-N curve, investigations to further inform on the concept design options and costings
- 2012 Risk assessment - dam safety risk plotted above the Limit of Tolerability for existing dams (as defined by ANCOLD 2003). The Risk assessment is presently being review based on recent (2019) studies.
- Concept designs - these are also in review following recent studies. Previous designs "bookended" the flood estimates, but the flood hydrology and consequence assessment have been updated since the issue of the concept designs (including cost estimates).

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	As a result of revised rainfall and flood estimates by the Bureau of Meteorology, new rainfall projections show a large increase in extreme rainfall events in the BFD catchment compared to values used for the original design. The standard design requirement, the Probable Maximum Precipitation Design Flood (PMPDF) for the dam, has increased since it was initially designed and constructed and, consequently BFD does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC). Engineering works undertaken in 2017 shows the F-N of Burdekin Falls Dam is presently above the ANCOLD Limit of Tolerability for Existing Dams.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above. Also, Sunwater also has obligations towards safety in accordance with the organisation's own Dam Safety Policy and prioritisation process.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The timing of the expenditure is proposed to occur over 7 years. The annual expenditure profile from the RFI 58 appears to be reasonable for the descirbed engineering and construction phases. The project should not be delayed as the consequence of failure is high. Sunwater has committed to completing the improvement works by October 2024.	None		QCA Information Request A56 (Attachments 1 and 3) QCA Information Request 58

	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Not applicable. The improvement is required in relation to new BOM rainfall projections and hydrology. Not related to asset life/condition.	None		QCA Information Request A56 (Attachments 1 and 3) QCA Inormation Request 58
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	Not applicable. The improvement is required in relation to new BOM rainfall projections and hydrology. Not related to asset life/condition.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)

Comment on Prudency	The project has a high level of documentation that justifies the prudency of the project. The Comprehensive Risk Assessment, Hydrology Reports, Concept Design Reports and Preliminary Business Case describe the project drivers. The dam does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC) and is above the ANCOLD Limit of Tolerability for Existing Dams.
Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	10 options were considered and this has been shortlisted to 2 options. After updated hydrology, three additional options were developed and the Concept Design Report revised. One of the new options was selected as the preferred option.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option achieves technical requirements for the project using a risk-based approach, and is the least cost acceptable solution.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
	Were/are non-capex options considered (such as operational solutions)?	YES	A do-nothing option was included but rejected.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard of works conforms with requirements for the level of design phase (concept). There are still significant studies and design phases to come. All works have been done in consideration of ANCOLD guidelines. Refer to Appendix B of the Concept Design Report for full list of standards and guidelines used in the options concept designs.	None		QCA Information Request A56 (Attachments 1, 2 and 3)
	Is the standard of works compatibile with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer to Appendix B of the Concept Design Report for full list of standards and guidelines used in the options concept designs.	None		QCA Information Request A56 (Attachments 1, 2 and 3)
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Flood and consequence studies are current best practice.		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Concept Design Report includes appropriate cost estimates, completed to an accuracy (-10%/+40%) higher than typically required for the concept phase (+/-75%). They are stated to be Class 5 estimates according to AACE guidelines.. The costs have included all indirect and ownership costs. The Preliminary Business Case provides an annual expenditure profile for the project, and references the [redacted] Concept Design Report for cost data source. Total project cost in $FY19 is $346M. This is considered the cost estimate with the highest level of supporting information. The total project cost in $FY19 in the QCA RFI 58 claim is $15M lower at $332M. While no explanation was included for the decrease, it is assumed that cost effiency measures were applied.	None		QCA Information Request A56 (Attachments 1, 2 and 3) QCA Information Request 58

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	Cost estimates are high level concept at this stage. Class 5 estimates according to AACE guidelines. No evidence was provided to show the Concept Design phase engineering consultants were competitively tendered, but this cost will be minor compared to total project. The PBC (Chapter 13) states that collaborative procurement strategies and project alliancing is the preferred strategy to mitigate time, cost and stockholder risks. Detailed assessment of procurement strategy was completed. The selection of the preferred procurement strategy will be revisited in the Detailed Business Case phase.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The cost estimates are reasonable for the current level of design. Specifically on indirect costs are inclusions for Contractor costs and insurance (21.5%), unlisted items (10%), owner costs and contingency and project risk (30%). A detailed breakdown of planned project development costs are also provided in the PBC.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The concept report includes assessment of risks and opportunities.	None		QCA Information Request A25 (Attachments 3, 4 and 5)
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	Chapter 11 of the PBC includese whole of life costs including inflation and escalation.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were options considered in determining the least cost or preferred option?	YES	10 options were considered, 3 additional options added. Revised preferred option was $173M less than previous preferred option. It is the least cost option.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	A multi- criteria assessment was undertaken for shortlisting of options. NPV of whole of life costs was also completed.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Refer above	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56
Have any potential efficiency gains been identified?	N/A	Not relevant here for this concept level phase. Risks and opportunities were evaluated.	None		

Comment on Efficiency	The level of documentation for the project is high. The Concept Design Report and Preliminary Business Case provide detailed assessment of options, scope, risk, cost, etc. The project is deemed as efficient in scope and standard. As the project is only at concept design stage, the cost estimates are high level concept and have been undertaken according to AACE guidelines and using information provided by Sunwater. The costs have been stated to be within an accuracy of -10%to +40%. This is more accurate than the level specified in Sunwater's cost estimate process for the preferred option concept design (+/-75%). The total project cost claim is lower than the cost estimate presented in the Preliminary Business Case and cost effiency measure have been assumed to be applied to allow the decrease.
Efficient	YES
Documentation Quality	High

Project Name	**Fairbairn Dam - Dam Safety Upgrade**
Project Number	
Project Description	**Spillway Improvements for Fairbairn Dam**
Asset Type	Water supply dam
Year(s) to be Delivered	2016 (BC Phase 1) - 2021 (completion of stage 2/3)
Cost	FY16-20: $147M FY21: $21.0M

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:
- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	In accordance with the Queensland Dam Safety Regulator's and ANCOLD's Guidelines (Limit of Tolerability), the societal risk posed by Fairbairn Dam in its pre-Project state is unacceptable. That is, due to the identified deficiencies to the spillway, Fairbairn Dam is exposed to a higher risk of dam failure (during a flood event) than desirable, an issue that requires addressing as soon as practicable. The follow on effects of a potential dam failure include significant loss of life and property damage to communities downstream of the dam; ongoing loss of regional water supply impacting commercial sustainability within the region, as well as the financial, reputational and legal implications to SunWater's business. Risk assessment shows the F-N is presently above ANCOLD Limit of Tolerability for Existing Dams and upgrade works are required to reduce this risk.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	On societal risk based assessment and flood requirements. The F-N assessment under the ANCOLD guidelines evidence the intolerable safety risk that the condition presented. The project has been split into stages to address (at least what was considered to be at the outset of the project) the highest risk elements prior to the imminent wet season (FY17)	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval

	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Dam safety obligations fall under regulatory requirements. Under the Water Supply (Safety and Reliability) Act 2008, dams are required to be maintained to reduce risk of dam failure and consequential loss in line with Queensland's independent Dam Safety Regulator (DNRME), and relevant national (ANCOLD) and international guidelines. As the dam owner, SunWater has clear legal obligations to ensure the structural and operational integrity of its facilities and the safety of downstream communities. To ensure that this obligation is properly discharged, SunWater utilises and has in place a Comprehensive Dam Safety Management Program (CDSMP) which adopts the standards and guidelines as stipulated by the Queensland Dam Safety Regulator (the Regulator) and as recommended by ANCOLD.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	There were / are three stages to the project. Stage 1 was the immediate works required to reduce risk for the FY17 wet season. Those works were completed in December 2016. The stage 2 and stage 3 works are ongoing to continue to reduce the risk to tolerable in accordance with the guidelines. The Portfolio Risk Assessment and other project risk assessments identify the intolerable risk that the current pre-project condition presents and the urgency in needing to carry out the work.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request 5_Attachment 1_DIP Draft Portfolio Risk Assessment QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	The dam was constructed between 1969-1972 putting it at 47 years and should have an asset life of 80-200 years. A condition inspection identified immediate need for repairs.	None		QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Investigations into the condition of the spillway which initiated the project were carried out in 2014-15. Since the stage 1 project has commenced, additional investigations have been carried out into the substructure condition which has presented additional intolerable risk.	None		QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs
Comment on Prudency		There is sufficient documentation on the risk assessments and regulatory requirements evidencing the need for this project. The project scope appears to have evolved over time. Some of this evolution was planned as part of the staged approach. Other parts were unplanned primarily as a result of unexpected sub-surface conditions. The risk assessments carried out on each project element demonstrate the prudency of the project.				
Prudent		YES				
Documentation Quality		High				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Yes	As the business cases demonstrate, the project was split into stages with options assessments generally for the discrete projects. The Stage 1 comprised four high level options (do nothing, construct a new spillway, carry out spillway improvement works, or drain dam). From there, 4 detailed options for improvement works ultimately recommended the staging option. At Stage 1, the scope of subsequent stages were not yet defined. Following additional investigations during Stage 1, additional options assessment were carried to select Stage 2 & 3 designs.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request 5_Attachment 1_DIP Draft Portfolio Risk Assessment QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Yes	The selected option allowed for the most flexibility in scope, budget, and schedule while still achieving the project technical requirements.	None		QCA Information Request A27_Attachment 1_Comprehensive Risk Assessment QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul
	Were/are non-capex options considered (such as operational solutions)?	Yes	A "do nothing" base case and a drain/decommission the dam were part of the option evaluation for completeness. They were not shortlisted.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The works are stated to comply with ANCOLD guidelines and relevant standards.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The design was completed to approrpriate standards and included modern design techniques such as CFD and physical hydraluic modelling.	None		QCA Information Request A25 (Attachments 4 and 5) and A56 (Attachment 1)
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Flood and consequence studies are current best practice. Preferred option meets the ANCOLD guidelines for tolerable risk		None		

Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	According to the Updated Business Case, the budget for Stage 1 was $35M, which included Stage 2 design. The actual expenditure, a historical cost, was $38.3M. The funds approved for Stage 2 Spillway Improvements & Rectification were originally $60M but were increased to $85M (a combined $120M for Stage 1 & 2). The Stage 3 Spillway Chute Gravity Side Walls (Stage 3) was originally costed at $28M but was increased to $45M. Across all three stages, the total incurred cost up to February 2019 was $82.8M. Sunwater has proejected the project to continue until late 2020 or mid 2022 with a total project cost of $168M. While the project almost doubled in cost from the original budget, the changes in scope are well documented and justified.	None		Dam Safety Upgrade Forward Expenditure Conversion to FY19$.xlsx QCA Information Request A27_Attachement 16_Project Costs - Stage 1&2 Mnthly Rep - 2019 Feb.xlsb QCA Information Request A27_Attachement 16_Project Costs - Stage 3 Mnthly Rep - 2019 Feb.xlsb
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	The construction contract was awarded to [redacted] and were stated to be in accordance with the procurement strategy but there was no supporting documentation to show the results of the procurement process and whether the selected bid was within reasonable range of other offers. No procurement details for design consultants were provided either.	Medium	Unable to quantify	
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	A summary showing a breakdown for indirect costs was not provided. Non-direct costs were budgeted at ~26%, which is reasonable for a civil type project.	None		
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	While at a high level, the governance processes of the project appear to be suitable for managing the risks - assembling a Technical Review Panel, generally following the project management framework. However, in the urgency of commencement of stage 1 there appears to be two key risks/ assumptions that have not been given due attention, being the risk of latent conditions - different ground conditions, and the significant pressure fluctuations occurring under the side walls during significant flood events, that was not previously recognized. Both of these led to additional costs due to design rework, additional works, and/or aborted materials procurement due to the change. Based on the commentary in the Design Report, it also appeared that the project generally suffered from rework due to the necessity to fast track construction concurrently with design.	Medium	Cost of design rework, aborting materials for the anchorage of the spillway floor when the decision was made to change to gravity walls. The cost of this cannot be quantified on the available information, but could potentially be accounted for in project contingency. It is also noted that no costs were reported for the side walls in the Stage 1&2 monthly cost reports.	QCA Information Request A25 (Attachment 4), A56 (Attachment 1). QCA Information Request A27 (Attachement 8)
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Escalation was not applied as the works were planned to be commenced immediately and within 18 month period. Schedule overrun did, however, occur.	Minor		Stage 3 Indep Cost Estimate
Were options considered in determining the least cost or preferred option?	YES	Yes, options were assessed at the outset, and then sub options were assessed for components as more information became available in the course of the project. The preferred option was selected based on an MCA criteria as well as using Industry guidelines on Risk Assessment.	None		QCA Information Request A25 (Attachments 3 and 4), A56 (Attachment 1).

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	A multi- criteria assessment was undertaken for shortlisting of options. Consideration was also given to the residual risks and achieving an ALARP condition (risks as-low-as-reasonably-practical) in accordance with industry guidelines. However, it would appear that there were too many large risks that led to changes subsequent to the business case that may have had a bearing on the original outcome of the BC. ALthough, the project final cost is still lower than the next most acceptable option in the original options assessment.	None		QCA Information Request A25 (Attachment 4), and A56 (Attachment 1)
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	The project financial analysis did not account for future maintenance and operation costs as they are likely negligible in comparison to CAPEX. Instead, the financial analysis focussed on risk and potential loos of life rather than commerical opportunity.	None		Stage 1 Business Case
Have any potential efficiency gains been identified?	YES	It appears that in hindsight, the project would have benefitted in additional geotechnical and structural investigations which would have afforded a much better appreciation of the required scope of works, risks, etc. The need for the physical modelling which appears to have been raised as a key risk by the TRP in the early phase of the project may have been deferred excessively, creating rework and adding abortive costs.	Medium	Cost of design rework, aborting materials for the anchorage of the spillway floor when the decision was made to change to gravity walls. The cost of this cannot be quantified on the available information, but could potentially be accounted for in project contingency. It is also noted that no costs were reported for the side walls in the Stage 1&2 monthly cost reports.	QCA Information Request A25 (Attachment 4), A56 (Attachment 1). QCA Information Request A27 (Attachement 8)

Comment on Efficiency	While the general good project governance has been adopted at a high level, it appears that efficiency has suffered due to a lack of management of key project risks. It is evident from a number of the project documents, namely the Design Report and the Briefing note for shareholding ministers, that the project was beset by a number of challenges that affected scope, cost and schedule on the project. There appears to have been two key issues. The first is associated with insufficient ground and condition assessments at the outset leading to addition risks being identified and subsequently managed as the project progressed in construction. The second relates to the consideration of pressure fluctuations that could occur under the side walls during significant flood events, which was not initially recognized and could lead to dam failure. Both of these issues appear to have been identified in the outset; in the case of the former identified as a low risk in the Business Case and in the latter, raised as an issue early on by the TRP, but not duly appreciated. They consequently caused issues in scope during the execution of the project. The process of fast-tracking construction concurrently with design due to the assessed urgency of the project appears to have placed pressure on the design team to make design decisions / assumptions to allow construction to progress, which with the benefit of hindsight did not manage the associated risk appropriately and were to the detriment of efficiency. The substantial changes to the scope, budget and schedule post business case cast doubt on to the initial options selection as the final cost and schedule approach that of the original Option 3 New Spillway. Altogether, the project has a high level of documentation quality. The variations in the project are well documented although significant, they have been appropriately justified. The project cost claim matches the final approved budget/cost estimates. The overruns on the original budget are more likely related to original underestimating than poor project cost efficiency.
Efficient	YES
Documentation Quality	High

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